NetworkWorld

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10-YEAR ANNIVERSARY ISSUE

A look at the decade past and the decade ahead in enterprise networks

Ten Trends That Will Reshape Your Network

Career Dos and Don'ts for the Next 10 Years

Ten Luminaries Speak Out on Tomorrow

Best Companies to Invest In for the '90s and Beyond

Technology Winners and Losers

Network Milestones for the Next Millennium

The Most Overhyped Stories of Our Time

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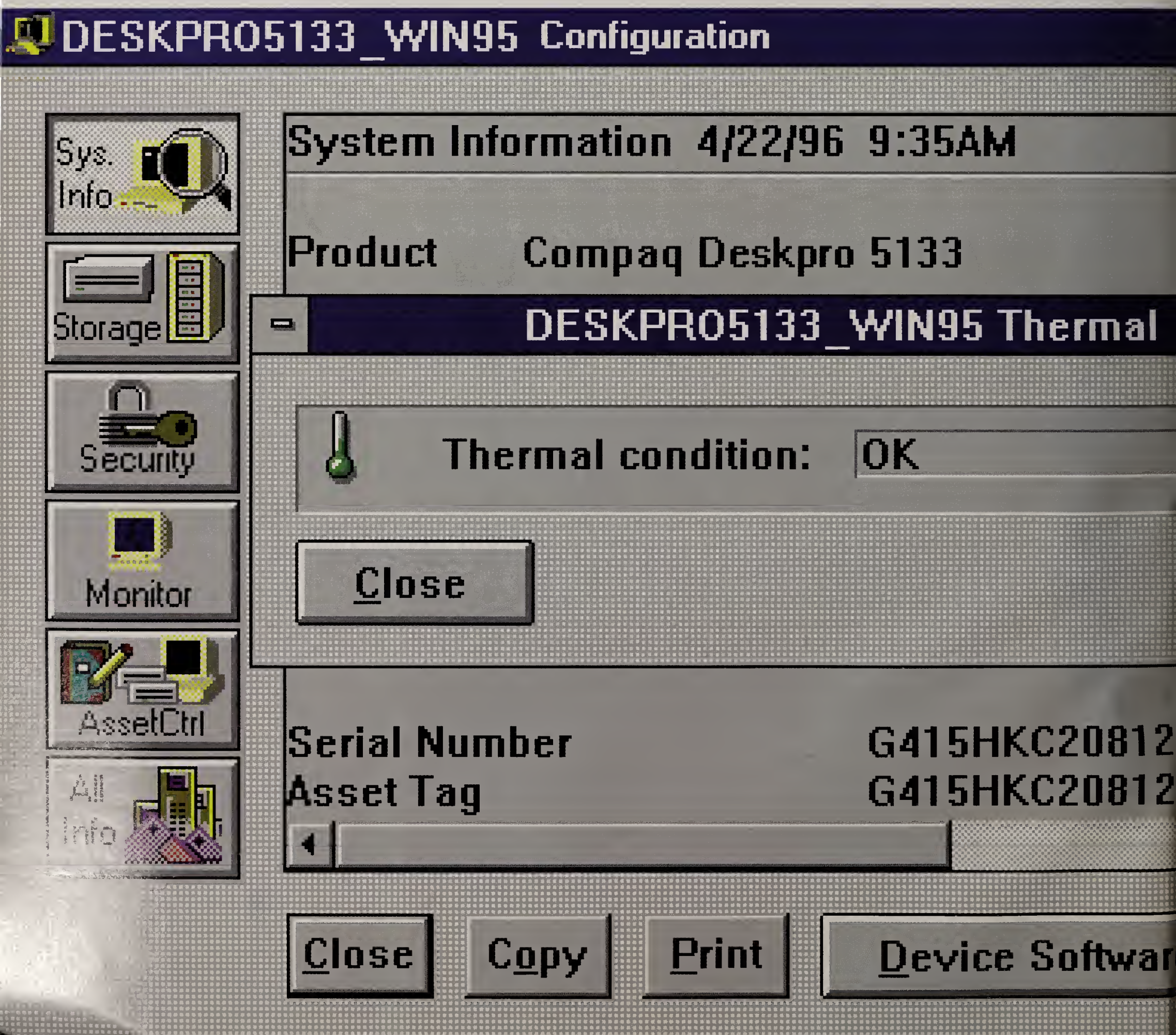
A Lot Of Computers Claim To Be The Best. This One Sends You Its Health Records To Prove It.



The biggest headaches always seem to come without warning. Well, that's no longer the case when it comes to managing the desktops on your network. Thanks to Intelligent Manageability, found only on the Compaq Deskpro, we've revolutionized the way you manage and support your desktops on a complex network. The Compaq Deskpro constantly keeps you informed of its vital signs. So before something goes wrong, you know about it. And even better, you're prepared.

The Compaq Deskpro.
With Intelligent Manageability, we've revolutionized the way you manage and support your desktops on a network. It raises your control to an unprecedented level.

By taking full advantage of the broadest range of management tools, we've redefined the meaning of control. And knowledge. Now, status reports are retrievable right from the desk of the administrator, allowing you to manage your entire PC inventory from a single location. And our commitment to open standards has driven us to develop the widest range of industry partners, making Intelligent Manageability easy to integrate into any network.

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COMPAQ

Has It Changed Your Life Yet?

intel inside
pentium® PROCESSOR

NetworkWorld 10 YEARS NetworkWorld
April 29, 1996

10-Year Anniversary


PAUL JOHNSON


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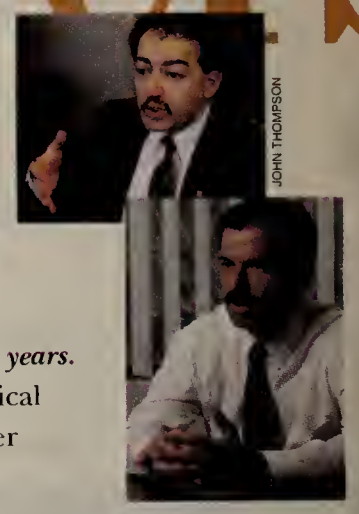
JOHN THOMPSON


STAN BAROUH
MARK ESCHER
SHAWN HENRY
JOHN THOMPSON

FROM THE EDITOR

In the great scheme of things, 10 years is, well, not all that long.

One can almost imagine celebrity astronomer/author/pundit Carl Sagan intoning: "Ten years. Ten years. A mere blink of an eye in the life of the ever-expanding cosmos."

A blink? Not even. Maybe half a blink. You've got to stack up a lot of these decades to get from T-Rex to T-1 muxes, after all.

Even this networking thing goes back a long time. How long depends on exactly when you want to start counting. Drumbeats? Smoke signals? Telegraph? Telephone? ARPANet? Pick your starting date.

The point is that the past 10 years have seen the flowering of the network industry and the rise of the enterprise network manager as a key player within corporate America.

Networking is driving the world economy, and network managers are behind the wheel. And for the past 10 years, *Network World* has been the road map for network managers. Except *NW* folds up easier. (Uh, sorry, that analogy got a little out of hand there.)

Anyway, here's to the past 10 years in networking.

But more important, here's to the next 10. Instead of getting all maudlin looking back, we've set our sights on the future. What better time than now to examine the technologies, issues and trends that will change your job and your network in the next 10 years? The stories in this special issue provide a sometimes serious, sometimes humorous look at what lies ahead for you.

And what better time to say thanks to our loyal readers and everyone else who has helped *Network World* share in the success of the network industry.

Congratulations to you for giving us so much to write about.

— John Gallant

ary Issue

TOM NORTON

WALTER CALLAHAN

BETSY BASSETT

Netscape's *Hahn discusses new directory and security servers. Page 8.*

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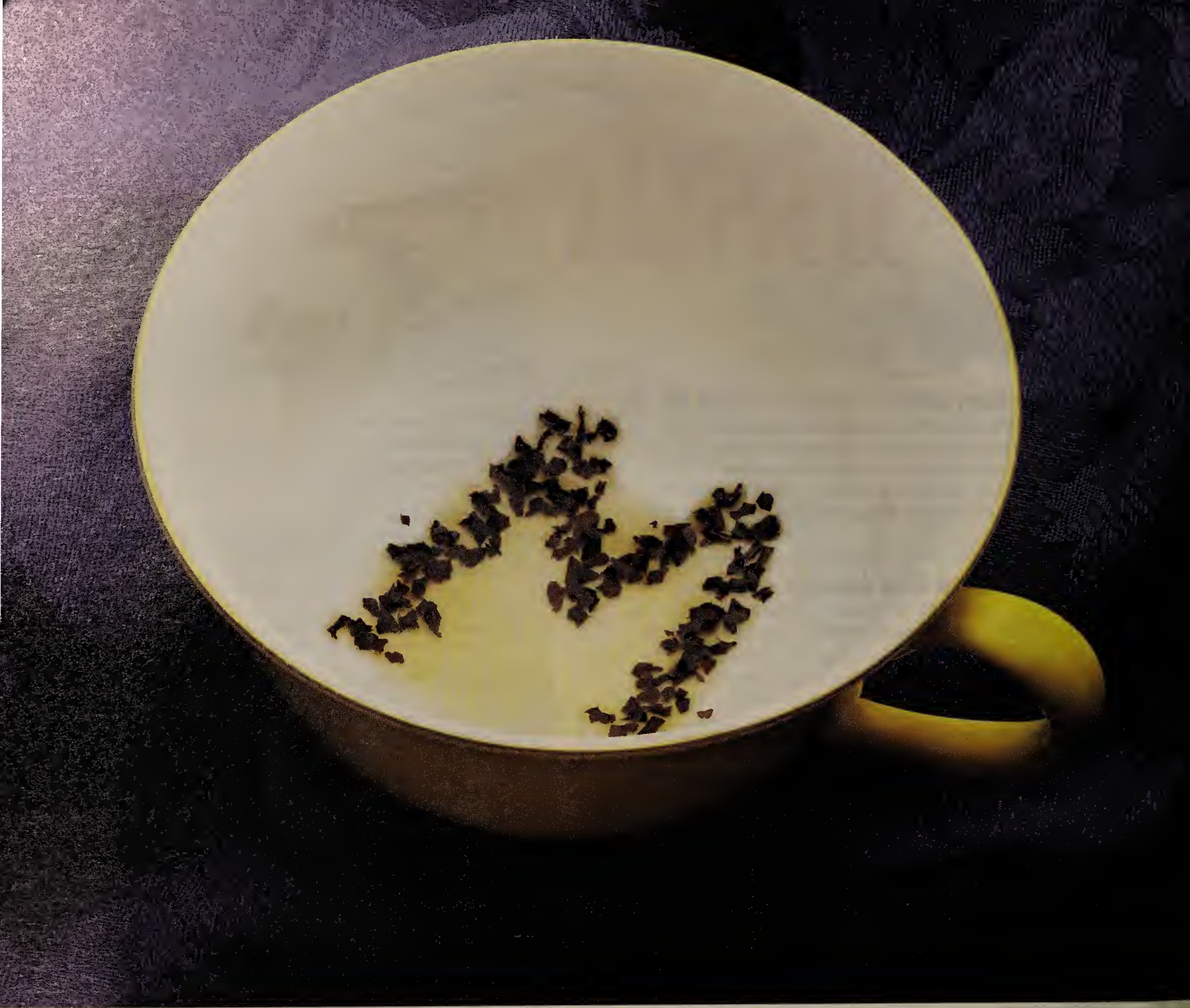
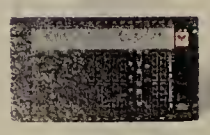


"I SEE A LONG AND PROSPEROUS RELATIONSHIP WITH AN ETHERNET SWITCH."



Some people may have their tea leaves read to pick the right switch. Fortunately there's an easier way.

Just go with Madge. The $400+ million company that makes the best enterprise Ethernet switches around.

In all kinds of benchmarks, the Madge LANswitch scored top marks in almost every category.

So if it sounds like you can expect more from our LANswitch, you're right.

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You also get SMON, the only software that can help you monitor your entire switched network.

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Check out our website at http://www.madge.com

Or stop by your local fortune teller today.

Madge Networks

SWITCHING TO ATM

Dept. 114

Heavy hitters back NT as core 'Net platform

By Kevin Fogarty
Los Angeles

Microsoft Corp. this week will round up a who's who of networking to bless its Windows NT Server as the preferred platform for the largest Internet sites.

Bay Networks, Inc., Cascade Communications Corp., Cisco Systems, Inc., Compaq Computer Corp. and Hewlett-Packard Co. will all vow to tune and integrate their products for NT Server, Microsoft's Internet Information Server and other 'Net tools from the software giant.

The vendors are part of a consortium supporting Microsoft's new specifications for its public network providers platform.

The group's goal is to deliver turnkey Internet server packages to a range of customers, Microsoft officials confirmed last week. The target audience will include cable companies and Internet service providers (ISP), as well as large corporations that are moving toward the World-Wide Web either for intranets or to act as content providers.

Microsoft will introduce the consortium, as well as a small group of ISPs and content providers that are already using

See **Microsoft,** *page 14*

Microsoft's Internet consortium

Microsoft has rounded up vendors to tune their products and servers to support NT Server and Internet Information Server as a standard Internet server platform, including:

- 3Com
- Andersen Consulting
- Ascend
- Bay
- BGS Systems
- Cabletron
- Cascade
- Cisco
- Compaq
- Digital
- Fore
- HP
- Livingston Enterprises
- MCI
- Motorola Multimedia
- Scientific-Atlanta
- U.S. Robotics
- UUNET
- WesTell

Industry upstarts go for gigabit Ethernet glory

By Jodi Cohen

ATM equipment vendors better watch their backs because a cluster of start-ups is gearing up to make gigabit Ethernet the LAN backbone technology of choice.

At least four vendors have plans in the works to offer 1G bit/sec Ethernet hubs and switches for connecting 100M bit/sec Fast Ethernet devices. This is just the tip of the iceberg, with more than 10 other such start-ups expected to appear during the next six months, analysts said.

"Gigabit Ethernet is the next hot market," said Todd Dagres, general partner at Battery Ventures, a venture capital firm based in Boston. "I've looked at eight companies' business plans already."

Early entrants in the market will include start-ups Granite Systems, Inc., Packet Engines, Inc., Prominet Corp. and Rapid City, Inc., industry observers said. Heavyweights 3Com Corp., Compaq Computer Corp., Hewlett-Packard Co. and Sun Microsystems, Inc. are also plotting gigabit Ethernet strategies.

Although a completed gigabit

See **Upstarts,** *page 18*

LAN BACKBONE SHOWDOWN SHAPING UP

GIGABIT ETHERNET	ATM
1G bit/sec wire speed	155M and 622M bit/sec data rates (2.4G bit/sec planned)
Backward-compatible with existing Ethernet and Fast Ethernet gear	Incompatible with legacy LAN infrastructure
Supports existing network protocols	ATM Forum has not agreed on how to run IP over ATM
Possible to support multimedia applications	Supports multimedia applications and provides quality of service
First products will ship within a year	Products available now

Accelerate over to Network World Fusion for more info, including:

- Articles on vendor proposals for gigabit Ethernet
- A look at a rival proposal for gigabit VG-AnyLAN
- A gigabit Ethernet tutorial

Select News+ then Front Page. http://www.nwfusion.com

Consolidation

Cisco snags StrataCom, Bell Atlantic weds NYNEX

$4b deal for WAN switch maker promises to be Cisco's most challenging acquisition yet.

By Jim Duffy and Tim Greene

Cisco Systems, Inc. last week made its largest and perhaps most challenging deal to date by announcing plans to acquire leading WAN switch vendor StrataCom, Inc. for $4 billion.

The size of the deal is unparalleled in the internetworking industry. And should it go through, Cisco would gain a set of high-end boxes that enable the company to provide customers with equipment from the desktop to the central office (see story, page 16).

"Together, we will shape the future of networking by redefining broadband internetworking for both the Internet service provider and the enterprise environment," said John Chambers, Cisco president and chief executive officer.

StrataCom would be the 10th company Cisco has acquired in three years. But this deal represents Cisco's trickiest test because it will have to:

- Resolve overlap between Asynchronous Transfer Mode products and strategies.
- Mesh corporate cultures.
- Meld myriad products into a unified strategy.

Cisco will have to address these issues while keeping the quality of its bread-and-butter routers up to snuff.

"I hope Cisco learns some of the discipline and support that StrataCom has, and that the size of Cisco will help StrataCom develop products quickly," said Elaine Stout, branch chief of telecommunications services for

See **Cisco,** *page 16*

A SWITCH IN TIME

Cisco's switch acquisitions to date

Company	Primary business	When it was acquired	What has happened since
Crescendo	Makes Ethernet-to-FDDI/CDDI workgroup switches	Sept. 1993	Melded into Workgroup Business Unit; product line expanded with LAN backbone switch
Kalpana	Ethernet switches	Oct. 1994	Melded into Workgroup Business Unit
LightStream	ATM WAN switches	Dec. 1994	Melded into Core/ATM Business Unit; product line expanded with workgroup/campus switch
Grand Junction	Fast Ethernet switches and hubs	Sept. 1995	Melded into Workgroup Business Unit; product line expanded with 10M/100M bit/sec workgroup switches
StrataCom	Frame relay and ATM WAN switches	Expected to be final in June	Plans announced to integrate WAN switch with routing for hybrid public/private nets

Bells blend into behemoth, but will it be a big telecom force?

By Tim Greene

When the merger of Bell Atlantic Corp. and NYNEX Corp. is complete, the mega-Bell will leapfrog competitors to become the second biggest kid on the block.

The new $28 billion company, using the Bell Atlantic name, will be second in size only to AT&T. And endowed with the rich Boston-Washington, D.C. business corridor, it will tap a local access revenue stream that

NYNEX *chief Ivan Seidenberg and Bell Atlantic head Raymond Smith shake on blockbuster deal.*

other regional Bell operating company combinations can only dream about.

But that does not mean Bell Atlantic will dominate as it tries to branch out beyond the local market. It could have considerable trouble making inroads into established interexchange carrier (IXC) territory. In fact, the company will have to defend its local turf from incursions by long-haul big brother AT&T, or even MCI Communications Corp. and Sprint Corp. — both smaller than the new Bell Atlantic.

And while it has designs to provide international service and video, the new Bell Atlantic has yet to prove it can do so.

Fire in the belly?

In the two-way battle with long-distance carriers, the IXCs may actually have the edge. "The long-distance guys have battle-hewn competitive skills, honed over 12 years of scrappy fighting

See **NYNEX,** *page 16*

News briefs, April 29, 1996

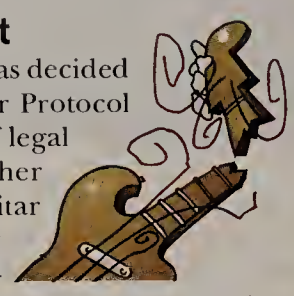
Not just another kitchen gadget

The next time you're in the kitchen and looking to make a dessert other than Rice Krispies squares or a Cool Whip pie, just dial the Internet for ideas. That's the idea behind one of several new network devices being announced this week by start-up Diba, Inc. (*NW*, April 15, page 10). The company, started by former Oracle Corp. employees, will announce a low-cost, low-overhead hardware and software system that makes it possible for household electronic devices such as telephones and televisions to link to the Internet, analysts said. The kitchen device will feature a CD-ROM drive that displays recipes.

Bringing Notes and Exchange together

LinkAge Software, Inc. this week will announce LinkAge Message Switch, software that connects disparate electronic messaging and groupware systems, including Microsoft Corp.'s Exchange and Lotus Development Corp.'s Notes. The Windows NT-based software also supports X.400 and Internet messaging systems. The software will ship in the second quarter at prices starting at $14,000.

Guitarists' 'Net site gets tuned out



The University of Nevada at Las Vegas has decided to permanently shut down a File Transfer Protocol site popular with guitarists in the wake of legal threats by the world's largest music publisher (*NW*, March 11, page 1). The On-Line Guitar Archives had been temporarily closed by UNLV in February after EMI Music Publishing alleged that the posting of sheet music on the site constituted copyright infringement.

JetMail zooms onto the scene

NetManage, Inc. this week will become the latest company to enter the booming Internet mail market, taking the wraps off its JetMail offering. JetMail contains the mail client from the company's popular Chameleon desktop product plus an Internet mail server. Available now, JetMail includes Windows 95 or Windows NT server software and five JetMail clients. It costs $495.

Clear out — and this time we mean it

The Federal Communications Commission last week adopted tougher rules to remove microwave users from the 2-GHz band now assigned to the broadband wireless technology known as personal communications services. PCS licensees have alleged that some microwave users are making extortionary demands for compensation — one reason commercial PCS service is only available today in Washington, D.C., Baltimore and Hawaii, despite billions paid for licenses at last year's FCC auction.

From here to Micro-Infinity

Optical Data Systems, Inc. this week will announce an Ethernet-to-Asynchronous Transfer Mode switch module for its 10-slot Micro-Infinity Plus switching hub. The module supports 12 switched Ethernet ports and a 155M bit/sec ATM uplink port. The module supports LAN emulation, classical IP as well as virtual LANs. The Ethernet-to-ATM module is priced at $10,425 and will be available in May.

3Com busies itself

3Com Corp. this week will unveil a new processor board for its Cellplex 7000 Asynchronous Transfer Mode switch that doubles both the backplane capacity and port density of the device. Customers will be able to upgrade their existing chassis to support 32 155M bit/sec ATM ports and a 5G bit/sec backplane. The new ATM board will be available in July. Pricing has not been set.

Also, the company last week rolled out two new access routers. The AccessBuilder Internet 400 supports access to the Internet and IP-based corporate nets. The AccessBuilder Remote User 400 enables small offices with Ethernet LANs to connect to the Internet or other offices using IP or IPX protocols. Pricing for the AccessBuilder Internet 400 is $845, and the AccessBuilder Remote User 400 costs $995. Both products will ship this summer.

Digital sells off piece of Polycenter

By Jim Duffy
New York

Digital Equipment Corp. last week said it will sell a chunk of its systems management operations to Computer Associates International, Inc. as part of a broader enterprise management product and service alliance.

By divesting itself of some Polycenter products, which was expected (*NW*, May 30, 1994, page 1), Digital continues to sort through its myriad businesses to identify and retain only its core competencies.

"They're lopping off parts of the company that can make an [independent software vendor] uncomfortable" and preclude an ISV from marketing Digital hardware and services, said Brandon Musler, an analyst at Illuminata, Inc. in Nashua, N.H.

It also indicates that, despite some glowing financial results of late, Digital has not yet concluded its cost-cutting maneuvers. Digital last week recorded third-quarter profits of $124 million on sales of $3.62 billion.

Digital will sell between nine and 12 Polycenter products to CA that fall into the categories of network and performance management, and automated operations (see graphic). Digital will also transfer about 100 employees to CA.

Among the Polycenter products being retained by Digital are the Polycenter NetView network management platform; storage management software for Digital's StorageWorks business; ManageWorks server management software; and AssetWorks for asset management.

The agreement also calls for Digital and CA to standardize on a unified enterprise management platform based on CA-Unicenter, but incorporating Polycenter NetView and other Polycenter products. This effort appears to put Digital in conflict with IBM, which supplies the code for Polycenter NetView but is also a staunch systems management rival of CA.

"It has to represent some change in the Digital-IBM relationship," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo.

But IBM and Digital said there is no change in their 3-year-old Polycenter NetView arrangement.

Other aspects of the alliance call for:

- Digital to become a worldwide professional service provider for CA products.
- CA and Digital to collaborate on new products and services for the Internet and intranets.
- CA to support Digital's 64-bit Alpha computing environment, including development of CA-Unicenter and CA-OpenIngres on the Digital platform. In addition, CA will become an OpenVMS and Windows NT software development partner of Digital's.
- CA and Digital to collaborate in joint marketing and sales worldwide. ■

CA's new Polycenter line

Performance management
- Performance Expert
- Performance Advisor
- Performance Solution

Network management
- Solutions for Network Managers
- DECnet Manager for Unix

Automated operations
- Event Central
- Console Manager
- System Watchdog
- Scheduler

Netscape intros servers

Offers new directory, security servers and upgrades, too.

By Carol Sliwa
Mountain View, Calif.

Netscape Communications Corp. last week announced new directory and certificate servers, as well as upgraded messaging server and Web browser products.

Netscape's *Hahn says new servers will be delivered with LDAP.*

Netscape's Directory Server launch coincided with an announcement of key industry support for the Lightweight Directory Access Protocol (see story, page 12).

LDAP will be delivered as part of the Directory Server, which will enable corporate administrators to create and access directories of names and information stored on intranets and the Internet, said Eric Hahn, senior vice president of enterprise technologies at Netscape.

The software supports as many as 200,000 entries and can handle 100,000 queries per hour on a typical server.

Certificate Server, designed in conjunction with VeriSign, Inc., will enable companies to protect their on-line communications through the use of public-key certificates.

Both servers are due out in the third quarter and will run on Windows NT and Unix machines. They are expected to cost $995.

Version 2.0 of the new Mail Server adds support for the Internet Message Access Protocol 4 as well as new management features. It is set for a second-quarter release at a cost of $995.

Netscape's Navigator 3.0, known to beta testers as Atlas, promises enhanced management capabilities, including the ability to set up and lock in end-user preferences for directories, electronic mail, server settings, proxy addresses, security functions and help menus.

The software, which also gains Secure Sockets Layer 3.0 support, is due out in the second quarter and will cost $49.

Netscape: (415) 937-2555.

HOW TO REACH US

CALL: (508) 875-6400; **FAX:** (508) 820-3467; **INTERNET:** nwnews@nww.com; **WRITE:** Network World, 161 Worcester Rd., Framingham, MA 01701; **NETWORK HELP DESK:** Having trouble resolving a technical problem, locating resources or getting a vendor to follow up on a promise? Contact the Network Help Desk at (800) 622-1108, Ext. 451, or cnerney@nww.com; **SUBSCRIPTIONS:** nwcirc@nww.com; **REPRINTS:** In quantities of 500-10,000. Call (612) 582-3800. **MARKET LINE:** For details about future editorial projects, call (508) 820-7557.

ATM Forum looks to solidify market

By Michael Cooney
Raleigh, N.C.

Users and vendors at last week's Southeast Regional ATM Interest Group gathering got some good and some bad news.

The good news is that the ATM Forum's "Anchorage Accord" will freeze most new standards development for the next two years. The bad news is that the freeze does not preclude the need for users to forklift upgrade some existing equipment.

At the heart of the Anchorage Accord, which was reached at the forum's recent meeting in Alaska, was the decision to group standards into foundation-layer specs and extensions that will be built on top of those specifications.

The foundation-level components include the Physical Layer specification, Interim Layer Management Interface 4.0, Traffic Management 4.0, Signaling 4.0, Private Network-to-Network Interface 1.0, Broadband Inter-Carrier Interface and Network Management.

ANCHORING ATM SPECIFICATIONS

The ATM Forum's Anchorage Accord focuses on a number of core specifications, including those that follow. The specs are in the works and will be backward-compatible.

Specification	Function
Physical (Phy) Layer	Physical cabling
Interim Layer Management Interface 4.0	Address registration
Traffic Management	Bandwidth reservation
Signaling 4.0	ATM interconnectivity

Other specifications, such as LAN Emulation and Multi-Protocol over ATM, will also be included in the accord.

The extensions will include specifications such as Multi-Protocol over ATM (MPOA) and LAN Emulation (LANE) 1.0 specifications. MPOA defines how multiprotocol traffic will flow through Asynchronous Transfer Mode nets, while LANE defines how legacy LANs access ATM services.

"The key message for users is that we are going to get the core group of specifications to a solid level that they can feel totally comfortable with building end-to-end ATM networks," said George Dombrowski, chairman of the ATM Forum.

Most observers said the forum must stabilize standards and address the nagging concerns users have about the longevity of ATM products.

For example, the available bit rate (ABR) component of the Traffic Management 4.0 specification will require major hardware and software upgrades of existing ATM products.

While the constant and variable bit rate (CBR and VBR) specifications are ideal for voice and video, ABR is the key data flow control specification that defines how devices in ATM nets can take advantage of unused network bandwidth.

The new "ABR will essentially obsolete all switch and NIC cards installed to date," said Jim Hartford, president of the AdvanceNet Systems, Inc., an ATM consulting and design firm in Research Triangle Park, N.C. "Some vendors have proprietary implementations of ABR today that may be upgradable, but as a general rule, it will require a forklift upgrade because there are so many new things in [the accord]."

Fore Systems, Inc. executives disputed the forklift theory. "Backwards compatibility isn't a problem for our products because we can upgrade hardware and software modules as we implement new features," said Jeff White, a product-line manager at Fore.

But their confidence doesn't always spread to the user community.

"No matter what the vendors say, many of the new requirements will require module upgrades, which is an expensive proposition," added Phillip Emer, a network engineer for the computing center at North Carolina State University. ■

MCI 'Net service woes continue to escalate

By Joanie Wexler

In the post-reform telecommunications frenzy, service levels are slipping, most notably at MCI Communications Corp.

Several users said sales forces are pressured to hurriedly sell new services, often before the engineering and support sides of the house are ready.

MCI is bearing the brunt of complaints, particularly for its dedicated Internet access service. While the company has broken a two-month moratorium on new Internet service activations (*NW*, April 15, page 1) and has started filling its order backlog, some users say the MCI 'Net backbone is still dropping packets. This despite having just upgraded its capacity to 155M bit/sec.

"Anything coming off the MCI backbone is experiencing 85% to 90% packet loss [rendering the service] useless," said Bill Elswick, network engineer at Entertainment Technology Association, Inc., a software company in Santa Monica, Calif. "Things are as bad or worse since the upgrade."

Nobody's perfect

MCI Communications Corp. is not the only Internet provider drawing criticism.

"Sprint is no better," said Daniel Duffy, former vice president of Internet service provider (ISP) ValleyNet Communications. Duffy said his problems in getting T-1 service began when Sprint Corp. continually missed service activation dates. As a result, Duffy turned to MCI.

Similarly, Marc Albert, director of network engineering at Marketvision in New York, was "spitting blood for a week" when he discovered Sprint was filtering Class C IP addresses off its backbone (*NW*, March 25, page 25), which affected his traffic. "What they're doing is immoral and probably illegal," he said.

And NetCom On-Line Communications Services, Inc., a nationwide ISP with about 400,000 users, is getting a reputation for overselling its capacity. "NetCom has always sold service two steps ahead of its ability to support it," said John Hurst, director of engineering at Virtualize in Los Angeles.

Some chalk up Internet problems to the explosion in usage. "I think what some people perceive as bad service is simply a matter of congestion on the Internet," said Larry Resnick, chief technical officer at Liberty Brokerage in New York.

Still, many agree that ISPs could do a better job at cooperating with one another to solve interfacing problems rather than pointing fingers.

—Joanie Wexler

WHAT'S THE BEEF?

MCI 'Net customers complaints include:

- MCI selling services before they are ready
- Significant and unexplained activation delays
- 'Net backbone dropping packets
- Recent 155M bit/sec capacity upgrade ineffective in solving network problems
- Company's lackadaisical attitude in the face of problems
- Prices increases due to usage pricing, despite preexisting contracts

John Hurst, director of engineering at Virtualize, a Los Angeles firm that builds and hosts World-Wide Web sites for clients, is still experiencing about 20% packet loss over the MCI backbone. "MCI's response is simply to shake their heads and say I shouldn't be having these problems. But there is no unified approach for solving them," Hurst said.

To some, MCI's lackadaisical attitude is more frustrating than the technical problems. For example, it infuriated some that MCI sales staff was mum about the hold being placed on new orders. Sales representatives accepted the orders anyway, users said, promising near-term activation dates. When those dates were not met, it wreaked havoc with users' schedules and business plans.

For example, ValleyNet Communications' order for a T-1 link in February stretched, a week at a time, from 35 days to three months.

"They knew about this problem well in advance, yet continually insisted they'd meet their committed install date," said Daniel Duffy, former vice president at the central California Internet service provider (ISP).

Several others complained on the Web about ordering dedicated Internet access circuits from MCI as far back as November 1995 and being promised activation dates on the circuit of February 1996 — which stretched to April 15.

"My rep kept putting me off one week at a time," said one irate ISP. "Rather than waiting another 45 days to get hooked up with another provider, I hung on like a horse with a carrot dangled in front of his face." He said he had counted on MCI for the cornerstone of his business and poured tens of thousands of dollars into equipment, leasing, personnel and promotions.

MCI answers

"It was never MCI's intention to mislead customers. You can't please everybody; that's the reality of things," said the carrier's director of internetMCI marketing, John Scarborough.

He said the moratorium and April activation had been well communicated to the sales staff, and he "would have to look into each individual case" to unravel what had happened.

Users say they can live with temporary congestion problems as long as the service provider is upfront about the situation.

"MCI has a problem that the sales force gets ahead of the company's ability to deliver," said Bill Brent, telecommunications manager at EJV Partners, a market data firm in New York. EJV is negotiating its way out of an MCI frame relay contract now because of missed due dates, misrepresentation of prices, and poor support after disruptions and outages, he said.

Another ISP in Indianapolis said he is disgruntled that MCI is breaking contracts now that it has instituted a usage-based pricing model for T-3 speeds and higher. "My monthly bill has shot up from $29,000 to $65,000," said Bob Hoquim, president of IQUEST, Inc.

" 'Breaking' [contracts] is a difficult word," Scarborough said. "We're 'transitioning' contracts." He said most customers' bills should decrease with the usage-based scheme because "we're finding usage of customers who have bought T-3s is actually far below T-3." ■

It's Java Java everywhere

By Kevin Fogarty and Ellen Messmer

Sun Microsystems, Inc.'s JavaSoft subsidiary said it wants Java everywhere, and with help from a few operating systems rivals, it just might get its wish.

JavaSoft this week will announce it is licensing the Java programming language to IBM, Microsoft Corp. and others to put in their desktop and network operating systems.

Until now, JavaSoft has mostly licensed the language for use on Web servers and browsers. The sole exception has been Novell, Inc., which announced in March that it licensed the Java Virtual Machine — a layer of code that will run Java applications on NetWare servers without a Web browser present.

Novell crowed about its coup at the time, but JavaSoft is now aiming to put the Virtual Machine on every desktop and most servers.

That means users will not have to use special Java-enabled client software to take advantage of Java applications, according to sources at JavaSoft.

"In the operating system, the Java Virtual Machine is the piece of software that runs applets on the desktop," said JavaSoft sources. "Developers will be able to put Java in the application for whatever they're writing."

The Java Virtual Machine will go into IBM's AIX and OS/2, Microsoft's Windows and NT, and Novell's NetWare, sources said. Java will also be going into Unix operating systems, such as those from Hewlett-Packard Co. and Sun.

Microsoft will build the Java Just-in-Time compiler into Internet Explorer, then expose the Java APIs through NT so a Java application can run without launching a browser, sources said.

For NetScape Communications Corp., the only browser vendor that currently supports Java, the widespread adoption of the Virtual Machine is a blow.

Microsoft, for one, is eager to build native Java support into its operating systems to enhance the Web browser it is also building in. By doing so, the company can eliminate the need for NetScape's Navigator or, indeed, any independent software, on top of Windows, said David Smith, an analyst at Gartner Group, Inc. in Stamford, Conn.

"Microsoft is trying to make the browser go away," Smith said. "Microsoft would have you believe there is no reason to have a stand-alone thing called a browser. They want anything and everything that's cool and useful about the Internet to be built into their own products to make that [NetScape] threat go away."

But users, who will gain the ability to run Java applications on a variety of machines with little performance degradation, are the real winners, said Tim Sloan, an analyst at Aberdeen Group, Inc.

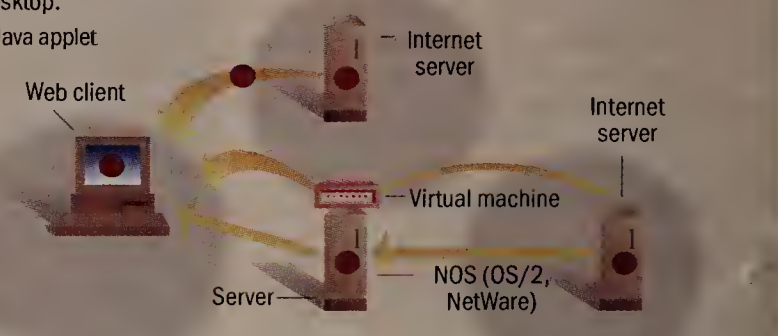
Because Java is an interpreted language, which relies on an easily ported bit of underlying code to talk to the operating system, it was easy for JavaSoft to make it run on Unix, Windows and other common operating systems.

Putting the Virtual Machine — Java's native operating environment — inside the operating system should give Java applications the speed of those written in a compiled language, while still allowing them to run cross-platform, Sloan said.

It does not, however, calm those who fear a standardized operating environment and Internet distribution of software form the perfect breeding ground for viruses and hackers, Sloan said. ■

Two ways to download Java applets

1. Previously, Java applets needed to be downloaded by end users directly to the desktop.



2. Now Java applets can be downloaded to an intermediate server running a NOS so that processing of the applet can be split between the server and the desktop. Microsoft, IBM and Novell are adding support for Java's virtual machine to their NOSes in order to run the applets.

Xylan switch looks to rein in net-clogging multicast traffic

By Jodi Cohen
Calabasas, Calif.

Multicast traffic is like buckshot; it sprays everywhere and, in the process, clogs up the network. But Xylan Corp. hopes to aim traffic only at those who need it.

Later this month, the company will announce two new virtual LAN software upgrades to its OmniSwitch and PizzaSwitch switches that will allow net managers to create separate domains for running multicast applications.

Because switches blast out multicast frames everywhere except the port the frame comes in on, all users on the network are bombarded, regardless of whether they need the data. This random spraying of multicast traffic can quickly saturate an Ethernet LAN, which eliminates the performance gains of switching.

To combat this problem, Xylan will offer its new Multicast VLAN software for its switches that allows net managers to create a VLAN that restricts delivery of multicast traffic to only those that need it.

Two new VLAN varieties

Xylan will enhance its switches' VLAN implementation to support multicast domains for customers running applications — like stock quotes or cable TV — that take advantage of muiticasting to distribute data.

Multicast VLAN: A software upgrade, which will ship in the third quarter, that allows switches to define a VLAN based on a multicast destination address.

IGMP VLAN: A software upgrade, available in the fourth quarter, that will allow clients to use IP's IGMP protocol to signal when to begin and end membership to a particular VLAN. Reconfiguration of these VLAN happens automatically.

"If someone is on an IP subnet and wants to get multicast video, he should belong to a specific multicast VLAN," said John Bailey, vice president of development at Xylan. "But everybody else who belongs to that IP subnet shouldn't have to pay the penalty of CNN video traffic just because one guy wants to see it."

Xylan customer Nicholas Heilweil, senior telecommunications analyst at The J. Paul Getty Trust, a nonprofit philanthropic foundation in Los Angeles, said he is eager to employ multicast VLANs.

"We'd like to put multicast videostreams on the net, so we need a way of confining traffic to only those users who need the data," he said. "Also, we don't want the workstation to permanently be a member of the VLAN, so we need an automated mechanism for controlling entry."

Customers will need Xylan's other new software upgrade, dubbed IGMP VLANs, to automatically set up and tear down VLAN memberships as users' application needs change.

An IP Multicast client uses Internetwork Gateway Multicast Protocol (IGMP) to signal that it wants to participate in a multicast session. Xylan's switches intercept these IGMP packets before delivering them to a router and automatically place clients in the appropriate VLAN.

The switch then communicates upstream — either to a third party's external router or to the switch's built-in router — to let the router know that a new device has joined a particular VLAN. Conversely, when an IGMP packet signals that a client no longer wants to be part of a particular subnet, the switch would drop the client's membership to the VLAN.

Xylan's Multicast VLAN feature will ship in the third quarter, and the IGMP VLAN software will ship in the fourth quarter. Both software upgrades are free for existing customers.

Separately, Xylan next month will unveil the next generation of switch modules for its flagship OmniSwitch chassis. The SuperSwitch modules will add memory and high-level management features, including built-in Remote Monitoring.

©Xylan: (818) 880-3500.

Nortel marries Entrust to Delrina

By David Rohde
Anaheim, Calif.

Northern Telecom, Inc. this week will join its Entrust security software to the hip of a popular electronic forms software package.

At the Electronic Messaging Association show here, Nortel and Symantec Corp.'s Delrina division will announce Delrina's FormFlow software will support the Nortel Entrust family of client/server security products.

The move is one of several announcements — many Internet related — Nortel plans to make at the show.

Its Secure Networks Group, which produces the Entrust software, will begin offering free Web server demonstration certificates that allow users to establish standard X.509 directories. These certificates can be used by certificate-aware browsers, such as Netscape Communications Corp.'s Navigator, to establish an encrypted session with the server software and exchange sensitive information.

And Nortel's private branch exchange unit will join with voice mail king Octel Communications Corp. and many other vendors to introduce a new protocol for voice mail interoperability. Dubbed Voice Profile for Internet Mail (VPIM), the protocol utilizes transport of compressed voice files over the Internet.

Nortel's Entrust initiatives are an attempt to extend its lead in the race to provide users with a security platform that works across multiple applications instead of forcing users to rely on each application vendor's security routine.

Entrust provides digital signing of files through public-key encryption — a routine that appends a unique mathematical fingerprint to each document and uses recipient lists to restrict delivery. It must be installed on each user's client PC, at prices ranging from $50-$125 per user (*NW*, March 11, page 57).

The idea behind marrying it to Version 2.0 of Delrina's FormFlow is that users not only can create their own secure electronic forms based on existing paper versions, but can also authenticate file attachments, such as Microsoft Corp. Word or Excel files. FormFlow 2.0 is expected to begin shipping later this quarter, with the Entrust-aware version shipping shortly thereafter.

Providing demonstration X.509 certificates on the Web will let users test how Internet and intranet transactions can be secured through a single, interoperable platform. "You can go and get a certificate to play with," said Brian O'Higgins, director of Nortel's Secure Networks group. "It shows how Entrust works with the Web."

Beta tests of VPIM will probably begin this summer, said Jim Burton, president of Boston consultancy C-T Link, Inc. "There's no rocket science here. It's a matter of productization." ■

Soft-Switch hits SNMP hard

By Barb Cole
Anaheim, Calif.

This week Lotus Development Corp.'s Soft-Switch division will jump into SNMP management and announce plans to break its main product into components.

At the Electronic Messaging Association '96 show, Soft-Switch will take the wraps off MessageView, client-based software for monitoring mail systems compliant with Simple Network Management Protocol, and Message and Directory Management, or MADMan.

EMA 96

MessageView will initially work with Hewlett-Packard Co. OpenView management platform, but support for IBM management products is planned, according to Steve Layne, vice president and general manager of the Soft-Switch division.

MessageView lets administrators track the status of messages and monitor the performance of electronic mail networks from OpenView. The software also has a component that lets users view the status of messages via any Web browser.

Some could use the help. "Our mail network is pretty management intensive, and most of that is done manually," said Scott Webster, systems architect at Canadian Occidental Petroleum, Ltd. in Calgary, Alberta.

Going to pieces

The rollout of MessageView is part of a broad plan by Soft-Switch to offer components that can be plugged into mixed messaging and management environments.

Today, Soft-Switch's offerings are available for mainframes or sold as hardware/software bundles running on Data General Corp. AViiON machines.

But by the beginning of next year, the company's gateways, directory, and monitoring and management tools will be sold individually.

And when the company completes work on its X.500 directory — previously known as Lotus Pages — it, too, will be sold stand-alone. The as yet unnamed directory is expected to enter beta in the third quarter and will ship first on Windows NT, Layne said.

Soft-Switch will also broaden its operating system support by rolling out versions for HP-UX sometime this fall and IBM AIX around the fourth quarter of this year. While Soft-Switch has yet to announce support for OS/2 or Windows NT, "it's clear that we'll do something in that area," Layne said.

Analysts applauded Soft-Switch's plans. "Given the way the market is, a modular approach is better than a monolithic one," said Eric Arnum, editor of "Electronic Mail & Messaging Systems," a Washington, D.C.-based newsletter.

Pricing for MessageView was not available.

©Lotus: (800) 343-5414.

How MessageView helps

- **Tracks** the status of any message on the network
- **Lets** administrators view management information via Web browsers
- **Supports** SMTP and MADMan messaging standards
- **Offers** performance monitoring tools
- **Monitors** the Lotus Messaging Switch

Netscape takes directory aim at Microsoft

By Kevin Fogarty and Carol Sliwa
Mountain View, Calif.

Netscape Communications Corp. last week caught rival Microsoft Corp. by surprise, getting a group of leading network industry players to rally around a proposed directory standard based on a subset of X.500.

Netscape and a consortium of more than 40 other vendors, including IBM and Novell, Inc., vowed to support the Lightweight Directory Access Protocol (LDAP) as a way to share and synchronize user data among the directories in electronic mail applications, network operating systems and other products.

The move was seen as a direct hit on Microsoft's own directory services standard proposal, dubbed Open Directory Services Interface (ODSI).

"We found out Monday from the Web and the wire" about the consortium, said Enzo Schiano, a product manager for Windows NT Server at Microsoft.

In the wake of implications from Netscape and its partners that Microsoft would be shut out of an industry wholeheartedly embracing LDAP, Microsoft staffers raced to post on the Web a position paper supporting it.

"We certainly didn't want the industry to think we're not supporting LDAP; we are," Schiano said. "We love standards, and LDAP is becoming recognized as a standard for lightweight queries across the net."

THE MEANING OF LDAP

The Lightweight Directory Access Protocol (LDAP) is a subset of the X.500 Directory Access Protocol that lets client-based applications do simple directory lookups over IP networks.

Did Netscape try to recruit Microsoft for the consortium?

"I really can't comment on that. All of these discussions were under nondisclosure," said Eric Hahn, vice president at Netscape. "We would welcome any vendor, Microsoft or otherwise, who is going to support Internet standards, provided they're really going to support them."

Netscape will build LDAP support into its newly announced Certificate Server and Directory Server, as well as into a version of its Navigator browser that is due to ship in the third quarter.

According to the Microsoft missive, the company will build support for DAP (the heavier duty Directory Access Protocol with authentication and administration) into the Exchange client as part of the package it is putting together to bid on the U.S. military's immense Defense Messaging System project.

It will also build LDAP support into a version of Exchange due to ship during the second half of this year, which will enable LDAP clients to access NT Directory Services. A release of Internet Explorer late this year will support LDAP, as will the next major release of Windows NT Server, due for beta testing next year, Schiano said.

If support for LDAP becomes widespread, it could become a standard protocol for users to search for other users or servers on the Internet or private intranets, analysts said.

"Netscape has rallied a lot of support around LDAP, so it will likely stick as a standard," said David Smith, an analyst at Gartner Group, Inc. in Stamford, Conn.

The move was intended as a way to go beyond Microsoft, which has been campaigning to make its ODSI the point of interoperability between directories. "ODSI is fine technology, but it's only available for the Microsoft product and Microsoft platform. So we think LDAP is a lot more attractive to the industry and to customers," Hahn said.

Microsoft rival Novell, which has been using a proprietary directory as a competitive weapon, has also adopted LDAP. "LDAP replaces a lot of the need for ODSI," said Vic Langford, senior vice president and general manager of Novell's Internet/Intranet business unit.

But Schiano said ODSI will support LDAP as a communications protocol. It will also offer features such as directory synchronization and schema management that are lacking or weak in the public LDAP specification, he said.

But Netscape has added capabilities to LDAP, including directory synchronization and server-to-server communications, Smith said. ■

Band-width is tight. ATM sounds nice. But it also sounds pretty darn expen-sive.

Switch IBM presents the first affordable 25Mbps ATM Workgroup Solution. Everyone is talking about ATM as the answer for speeding up busy networks. But there are two good reasons why business hasn't stampeded en masse to the ATM solution: It costs a lot. And to get there, you have to rip out everything you have.

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IBM

Solutions for a small planet™

Microsoft

Continued from page 7

products adhering to the specifications, at the National Cable & Television Association's Cable 96 show this week.

News of the group may serve as a counterpunch to the surprise announcement last week that Microsoft's chief Internet rival Netscape Communications Corp. pulled together much of the industry to support directory technology Netscape is ready to roll out (see story, page 8).

Consortium members have all agreed to use standard Microsoft API and Internet technology, and will either tune their products or create new products designed to mesh with Microsoft technology, sources said.

Microsoft officials said the consortium is more than a comarketing group, but they cautioned that it will take time for members to deliver tightly integrated product packages.

Microsoft, however, will build all of its Internet servers, present and future, into the public network architecture, and test them with products from consortium members for compatibility and configuration problems, according to Craig Mundie, senior vice president for consumer platforms at Microsoft.

The list of consortium members skews heavily toward modem and remote access companies such as Ascend Communications, Inc. and U.S. Robotics, as well as WesTell Technologies, Inc. — one of the leaders in the nascent market for high-bandwidth Asymmetric Digital Subscriber Line modems.

Also on the list are Motorola Multimedia, Inc. and Zenith Network Systems, which make cable modems capable of converting the same coaxial cable that now carries things like The Cartoon Network into a pipeline for high-speed, video-enriched Internet services.

The consortium is focused on delivering drop-in Internet solutions to giant content providers such as Telecommunications International, Inc. and Time Warner, Inc., which manage multiple nationwide broadband networks, Mundie said.

Corporate perks

But innovations on the high-end can also benefit corporate users trying to build internal intranets with rich features such as streaming video feeds and live teleconferencing.

Cisco, for example, is working to put its Cisco IOS routing software on such platforms as those that cable companies are building to supply net services over existing cable infrastructures, a Cisco spokesperson said.

While Microsoft had nothing to do with that work, it will cite Cisco as an example of the interoperability consortium members are developing.

"All Microsoft is doing is showing that there are products out there that can support public networks and that they can be the graphical interface to that, if you will," one Cisco official said.

But if Microsoft can gain preeminence among the ISPs, it may also build mind share and influence in large corporate sites, sources said.

Making it easier to assemble all the pieces of a complex intranet package is a "great idea," even if the initiative is aimed at public network providers, said John Dubiel, manager of strategic planning and technology at Boston Edison Co.

"It's a pain today; you've got to figure everything out yourself," Dubiel said. "But you can't just have a Web server; you need a mail forwarder and an FTP server, and a management platform off to the side to manage the routers, and you want to use the firewall to configure it all." ■

IBM packs 'Net into AIX

By Michael Cooney
Nashville

IBM last week used its eighth annual Technical Interchange conference here to turn up the volume on its Internet story.

The company announced a variety of products, including a new version of its AIX operating system with integrated 'Net support and new AIX-based servers.

"We think we are only at the earliest stages of Internet product development and usage. We have a lot of work left to do," said Irving Wladawsky-Berger, general manager of IBM's Internet Division.

As part of its effort to build Internet access and Web serving capabilities into existing packages, IBM rolled out a new 32-bit version of AIX, Version 4.2. AIX 4.2 contains the first AIX implementation of Sun Microsystems, Inc.'s Java programming environment, so users can build and deploy their own Java applets.

Also included in the AIX offering is the IBM Internet Connection Secure Server, which contains Internet gateways to IBM's DB2 and CICS mainframe systems that give users access to those resources over the 'Net.

The operating system comes with a bonus pack that includes a choice of Internet browsers, including Netscape Communications Corp.'s Navigator and Netscape's Commerce Server package. Users can buy a thin client version of AIX, called the Entry Client Package, that does not include all of the bells and whistles of a full 4.2 implementation.

IBM said it plans to:

■ Add new Internet mail support via the Post Office Protocol 3 to its AS/400 platform. Executives said the AS/400 would gain cc:Mail, Microsoft Corp.'s Messaging Application Programming Interface and support Exchange clients later this year.

■ Make its object-based System Object Model (SOM) packages available on its new World-Wide Web site. SOM Objects Version 1.2 can be downloaded from the SOM Web site (http://www.software.ibm.com/object/somobjects) for no charge. ■

FCC appeases Apple with cheap wireless LAN proposal

David Rohde
Washington, D.C.

If lobbying prowess at the FCC was all that counted, Apple Computer, Inc. would be sitting atop the computer industry instead of gasping for survival.

The company last week succeeded in its long-cherished goal to get the Federal Communications Commission to propose a new form of inexpensive wireless LAN technology ideally suited to its legion of school customers.

The FCC proposed to make a whopping 350 MHz of radio spectrum available for use by a new category of unlicense terminal equipment called National Information Infrastructure (NII)/SuperNet devices.

This would essentially include PCs or laptops with built-in or external radio receivers that can transmit data at up to 25M bit/sec over short distances of up to about 100 meters.

Because the set-aside spectrum would be unlicensed, users simply will have to purchase the products and power them up; LAN or carrier links will not be required. And part of the spectrum would be reserved for remote access within a geographically concentrated community.

To further ease the way for potential NII/SuperNet users, the FCC also proposed only the minimum technical standards necessary to prevent interference with other unlicensed devices, including a basic "listen-before-talk" protocol.

Apple's proposal runs counter to the FCC's policy of selling wireless spectrum wherever possible — a policy that has raised close to $20 billion for the Department of the Treasury since 1994.

But FCC Chairman Reed Hundt said Apple's idea would help link classrooms within buildings and allow schools to connect to the NII.

Many U.S. school buildings are much older than corporate sites running wired LANs, Hundt noted. "The walls are hard to get through — it's as simple as that," he said. ■

FCC hit with every conceivable idea

By David Rohde

It's as if the Red Sea parted again, and this time all of the Washington lawyers marched through.

The Federal Communications Commission, already besieged by swarms of lobbyists following passage of the Telecommunications Act of 1996, has opened itself up further with its recent proposal to expand universal service.

Lawyers for Kinko's, Inc. are suggesting citizens receive so-called Internet vouchers. These, of course, would be redeemed at Kinko's copy centers equipped with the chain's planned Community Internet Access Centers.

And lawyers for Apple Computer, Inc. are asking the FCC to give schools subsidized access to public networks at speeds as high as 45M bit/sec.

So why the mad rush? It is all because the FCC recently indicated it would take a liberal approach to granting universal service status to advanced services. And hundreds of organizations that stand to benefit are rushing in with ideas on how to do it.

Yet some prominent industry players are just as adamant that the FCC not go this route.

Attorneys for CompuServe, Inc., Netscape Communications Corp. and others are asking that the FCC not declare a universal entitlement to Internet access. They reason that Internet service providers — and possibly even software providers — could be hit up for subsidy payments to fund the scheme.

To reinforce the point, Glenn Manishin, an attorney for the technology law group at Blumenfeld & Cohen, Netscape's law firm here, met with top FCC staffers two days before Netscape made its 25-page filing.

Apple's proposal is perhaps the most expansive of all. It asks that all schools receive subsidized digital access ranging from the ISDN-standard 128K bit/sec to at least the T-3 standard 45M bit/sec. The proposal also demands "both fixed and mobile digital services" and "both dedicated and dial-up facilities."

But CompuServe Washington attorneys Randolph May and Timothy Cooney told the FCC that such mandates are a bad idea because "broad or intrusive subsidy programs that distort the workings of the competitive marketplace should be avoided."

Their arguments echo those of carriers and broad-based user groups that fear prices of nonsubsidized services could go up (*NW*, April 22, page 63).

Yet another blast of meetings and filings at the FCC is expected as industry players prepare comments, due May 8, on a recent petition by some carriers to ban voice transmissions on the Internet (*NW*, March 11, page 6). Educom, an association of 600 colleges and universities, has already made a filing blasting the proposal.

Migrating To Frame Relay?

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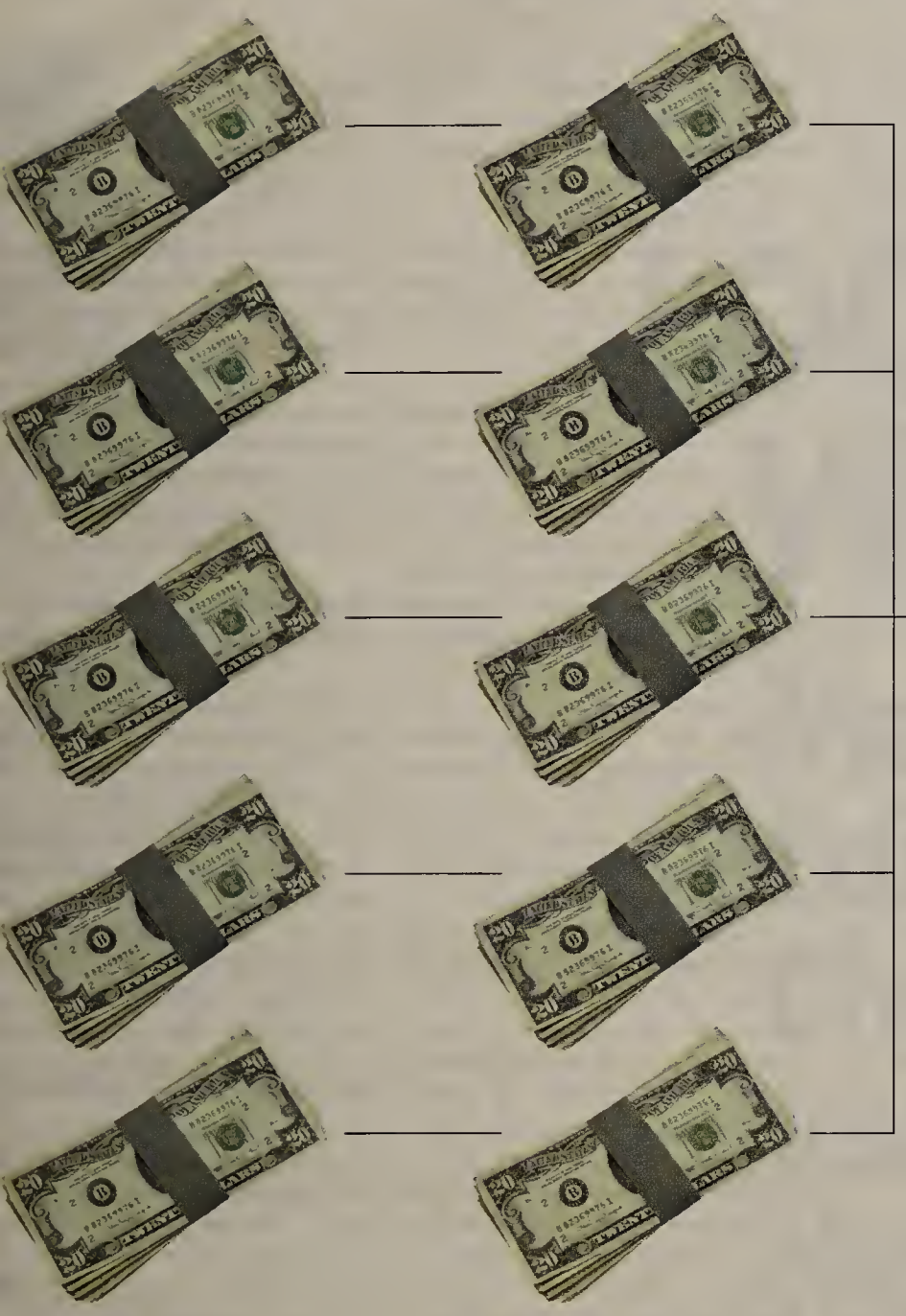

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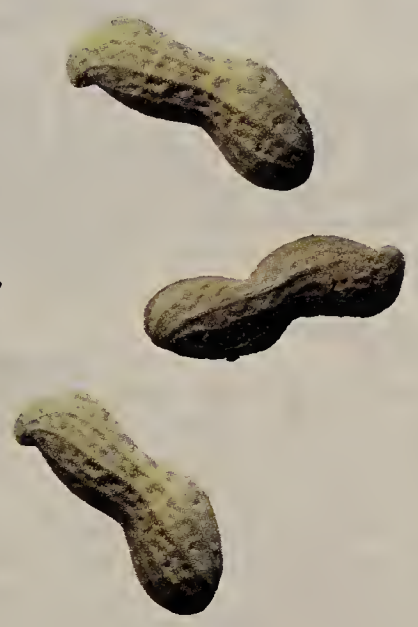

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Cisco

Continued from page 7

the U.S. Geological Survey's Earth Sciences group in Reston, Va.

A big challenge in the WAN and ATM area will be reconciling the overlap between StrataCom's boxes and LightStream 2020, Cisco's current WAN access and enterprise ATM switch offering.

"The StrataCom acquisition proves the fact that the LightStream acquisition was not good or didn't work out," said Michael Karfopoulos, a financial analyst at SoundView Financial Group in Stamford, Conn.

LightStream 2020 sales accounted for about $32 million of Cisco's roughly $2 billion in revenue last year, according to Vertical Systems Group in Dedham, Mass.

Chambers said LightStream products will be focused mainly at the campus backbone.

"We really have not seen the LightStream product at the high end compete with [StrataCom's] product," he said.

Tandem Computers, Inc. will vouch for that. Tandem recently put out a request for proposal for ATM WAN backbone switches, and Cisco pitched the LightStream 2020 and 2080 — the latter is under development — against switches from StrataCom, Northern Telecom, Inc. and others.

Though Tandem has not yet selected a vendor, the company is not considering the 2020 based on experience with the switch in an existing installation. "I couldn't get the kind of throughput I needed [to] use them in the wide area," said Warren Kirsch, director of Worldwide Telecommunications and MIS for Tandem.

Kirsch believes the StrataCom deal is the beginning of the end for the LightStream 2020. "I have to read between the lines that LightStream is dead," he said.

Analysts said there is more overlap between LightStream and StrataCom than Cisco is admitting, even if the 2020 is being repositioned as a campus switch.

"StrataCom's been trying to move into the campus, LightStream's been trying to move into the WAN," said Fred McClimans, principal at Decisys, Inc. in Sterling, Va. "There's going to be conflict there."

A Cisco spokesman at LightStream facilities in Chelmsford, Mass., said the 2020 is still Cisco's switch offering for campus and enterprise backbones, and that the company is moving forward with second- and third-generation product lines.

Though reconciling the impact on LightStream is a tough test for Cisco, entering a new market with new competitors and products is another, observers said.

"StrataCom gets them into a different business. They're selling different stuff," according to David Rothschild, vice president of technology research at Piper Jaffray, Inc. in Minneapolis.

Cisco is also dealing with an established organization this time, not another start-up, as has been the case with previous acquisitions.

The company could be facing its biggest culture integration test to date because StrataCom is seasoned in competing in markets foreign to Cisco — such as third-world telecommunications companies — and in dealing with far fewer customers.

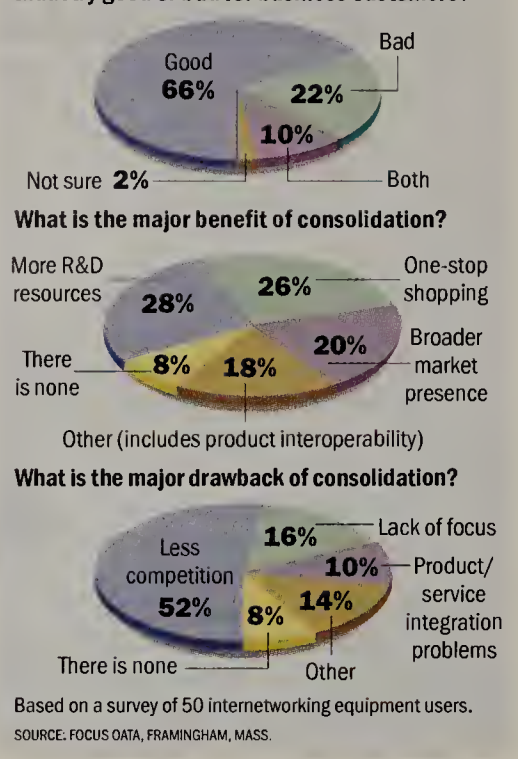
The stability factor

Some analysts, however, see StrataCom's stability as a boon for Cisco.

"They picked up $400 million in revenue, they picked up a well-entrenched, well-established infrastructure without any major overlap with the core of Cisco's business," said Rick Malone, principal of Vertical Systems Group.

Lastly, Cisco faces the potentially daunting task of melding all of the technology acquired to date into one coherent architecture and product line.

"The challenge is to define quality-of-service features or parameters that transcend both the StrataCom product line and the Cisco router line, as well as the Catalyst line," said Nick Lippis, principal at Strategic Network Consulting, Inc. in Rockland, Mass. ■



Deal lets Cisco enter new market

By acquiring StrataCom, Inc., Cisco Systems, Inc. gains not just a new product line, but a new customer base, as well.

On the product side, Cisco inherits an established wide-area switch that is the foundation for provisioning frame relay and Asynchronous Transfer Mode services. StrataCom's IPX, IGX and BPX switches currently anchor the public frame relay service nets of AT&T, CompuServe, Inc. and LDDS WorldCom.

This gives Cisco a solid foothold in the carrier marketplace. Though Cisco is no stranger to service providers — much of the company's customer premises sales are through carrier service/product packages — only about 20% to 30% of sales to service providers are for their service infrastructures.

"Cisco becomes the only supplier of an integrated point of presence, combining switching, routing and dial access in one network architecture," claimed John Chambers, Cisco's president and chief executive officer.

What that means for end users is that Cisco can now deliver an end-to-end set of voice, data and video services over public, private or hybrid network infrastructures, Chambers said.

Cisco will merge StrataCom switching with its routing technology to produce a line of scalable network products for public carriers, Internet service providers and large enterprises. These next-generation products will provide a large-scale, multiservice IP switching infrastructure to "relieve the congestion on the Internet [and] enable the new multimedia applications of the future," Chambers said.

—Jim Duffy

NYNEX

Continued from page 7

over every 10th of a point of market share. The Bell companies have never had to compete. It doesn't mean they won't learn, but their competitors have 12 years of experience behind them," said David Goodtree, an analyst with Forrester Research, Inc. in Cambridge, Mass.

The long-distance carriers also start off with national name recognition and national salesforces. Bell Atlantic, and all the other RBOCs for that matter, have neither.

The one implied edge RBOCs might have — owning access to the local loop — does not pan out in reality. Under the new telecommunications law, they cannot charge a competitor more for local access than they charge their own long-distance arm, which must be a separate business entity.

The key to IXCs and Bell Atlantic breaking into each other's markets will depend on packaging, according to Sanjay Mewada, an analyst with The Yankee Group in Boston.

Users have already settled on an IXC and need a compelling reason to switch — either through dramatically lower prices or a deal that addresses several needs such as local, long-distance and cellular service wrapped up together.

IXCs, on the other hand, can resell local service supported by fewer switches than it takes to support local service, Goodtree said. That gives them lower cost to support the service and the opportunity to undercut toll-free calling-area deals offered by the RBOCs.

Still, analysts estimate that 20% to 25% of the long-distance market is vulnerable to RBOCs, and that is a $14 billion business in the Bell Atlantic corridor.

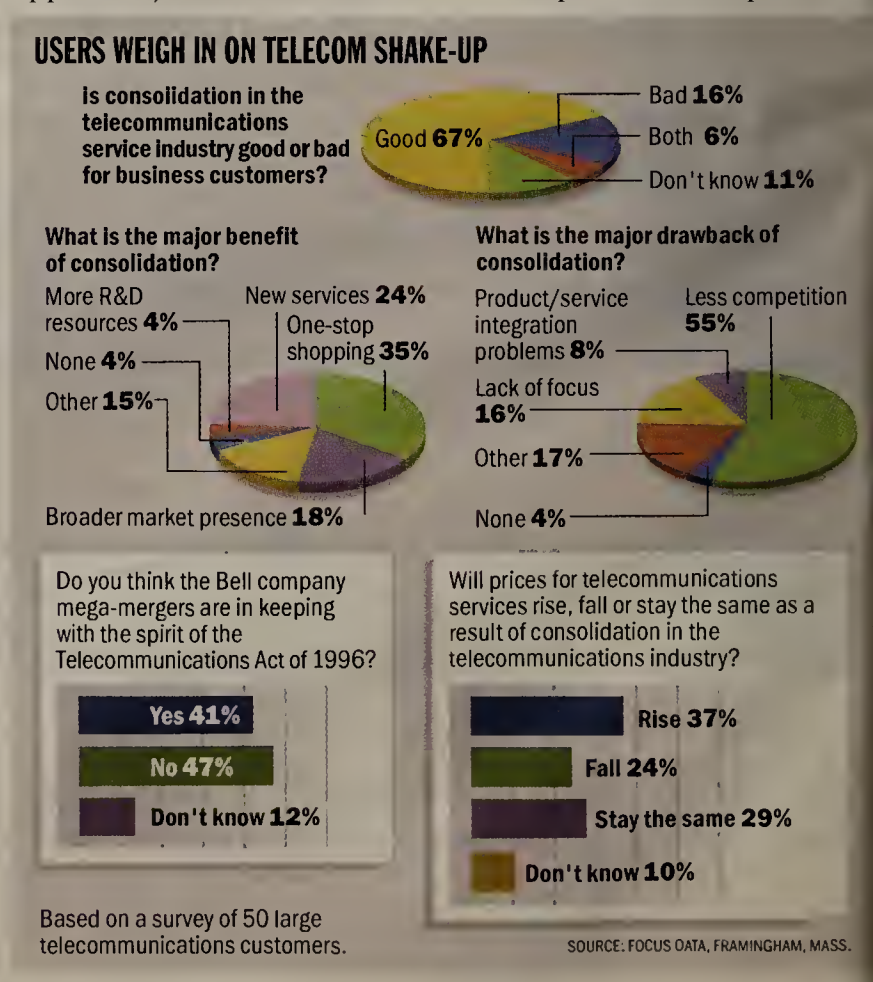
Prove it, pal

Both Bell Atlantic and NYNEX have invested in overseas properties, but neither has been allowed to offer international service and neither has announced international plans. But to become a supercarrier that can offer it all, they have to come up with the ability to connect around the world. "Large businesses require global networks, and these RBOCs are not known for managing global networks," Mewada said.

Regulatory scaps ahead

Meanwhile, AT&T and MCI have screamed the merger would be anticompetitive, just the opposite of the intent of the new telecommunications law that sets RBOCs free to merge. They are expected to push for potentially lengthy challenges and their arguments may have merit. "Bell Atlantic could have been NYNEX's biggest competitor in New York City," said Daniel Briere, president of TeleChoice, Inc. in Verona, N.J. "With the merger, NYNEX eliminated that."

But others view it differently. "I don't see how it's anticompetitive," said Ron West, telecommunications manager for Shearman Sterling in New York. "This will be a company with a lot of wherewithal that can mean a real shake-up to the marketplace." ■



Bell Atlantic and Nynex: The impact today and tomorrow

Does the proposed merger between Bell Atlantic Corp. and NYNEX Corp. dramatically improve your life as a network manager, or just give you one more thing to be concerned about?

Here are answers to some frequently asked questions about the combination of the two big Northeastern regional Bell operating companies.

Does the merger give me any new options for local network services?

Not for now. Neither company alone nor combined can carry traffic outside of their regional calling areas.

Does the deal get either company into a position to offer long-distance service any quicker?

The new Bell Atlantic, like all other local exchange carriers, will win the right to offer in-region long distance state by state. Because NYNEX in New York is arguably the closest to actually winning that approval, the new entity will likely start down the in-region long-distance path sooner than other RBOCs. NYNEX officials said they have met 12 of the 14 local competition prerequisites in New York for long-distance entry.

Could the combined company now buy a long-distance carrier?

Yes, but it is doubtful they could swing it until this deal is consummated. But they will resell long distance from Sprint Corp., which they will probably get cheaply because of the huge volume they will buy.

Is there much of a chance that the deal won't go through?

Last week, there were troubling signs. The stock price of both companies fell the first few days after the merger announcement. That's unusual. Typically, the price of the company perceived to be the one being taken over goes up. And both AT&T and MCI Communications Corp. said they would oppose the Bell Atlantic/NYNEX combination.

Does it make a difference that Bell Atlantic and NYNEX regions are contiguous, as opposed to the SBC Communications, Inc. and Pacific Telesis Group regions?

Yes, particularly because the two regions occupy the most telecom-intensive strip in the country, making it an imposing revenue source. SBC/Pacific Telesis gains no such might.

The merger also heals the break in the market between New York City and New Jersey, which is really one market. The breakup of AT&T that created the RBOCs split the two areas, creating connectivity headaches for users with sites in both locations.

Ironically, Bell Atlantic and NYNEX were on the verge of partially remedying that problem the week before the merger by filing a proposal to offer frame relay service across the Hudson River.

The two companies said they will cut 3,000 positions out of their combined 116,000-person workforce. That's not so bad, is it?

There's more to it than that. As NYNEX Chairman Ivan Seidenberg conceded, the 3,000 figure does not include a 2-year-old NYNEX program to reduce 17,000 jobs, which so far is 5,000 people short of its goal.

NYNEX customers can still expect more of the job reductions that users complain have been draining the company of its expertise.

What does Bell Atlantic plan to do about that?

Bell Atlantic Chairman Raymond Smith pledged that he will turn around NYNEX's service problems in one year.

—David Rohde and Tim Greene

Upstarts

Continued from page 7

Ethernet standard is not expected for at least a year from either of the IEEE 802.3 or 802.12 committees, prestandard products are expected to hit the market in six to nine months.

Vendors said gigabit Ethernet gear will cost $2,000 to $3,000 per port, about two to three times as much as 100M bit/sec Ethernet switches and about the same as ATM switches. But observers expect gigabit Ethernet equipment prices to fall below $1,000 per port quickly as the market grows.

Andy Bechtolsheim, president of Palo Alto, Calif.-based Granite, said that gigabit Ethernet is a much more obvious backbone technology than Asynchronous Transfer Mode because it is compatible with existing network protocols, net management software and applications. "Ethernet may not be perfect in all ways, but it is a dominant, established standard that everybody knows how to use, whereas ATM is a brand-new world," he said.

Bechtolsheim, one of Sun's first employees, also pointed out that there are not nearly as many interoperability issues with gigabit Ethernet as there are with ATM.

"If there was one lesson in networks over the last 15 years, it's that compatibility is the most important issue," he said. "ATM violates this on all fronts — we see ATM as the most incompatible network that anybody ever thought about."

Bernard Daines, president of Packet Engines in Spokane, Wash., agreed that backward-compatibility is a big feather in gigabit Ethernet's cap.

"There is full interoperability between 10M, 100M and 1G bit/sec Ethernet with respect that exactly the same packet will go back and forth between all of them," Daines said.

However, gigabit Ethernet differs from regular 10Base-T in that it relies on Fibre Channel technology at the physical layer and does not support Ethernet's carrier-sense multiple access with collision detection scheme.

Daines, who founded Fast Ethernet leader Grand Junction, Inc., said he remembers when people wondered why anyone would want Fast Ethernet when FDDI was an established, highly redundant technology.

"If there was one lesson in networks over the last 15 years, it's that compatibility is the most important issue. ATM violates this on all fronts," Granite President Bechtolsheim said.

"Gigabit Ethernet will do to ATM what 100M bit/sec Ethernet did to FDDI," he said. "It's true that ATM has better management and quality of service, but people really don't want the complication of ATM."

Packet Engines will initially focus product development on connecting 100M bit/sec hubs using 1G bit/sec switches and will also build half- and full-duplex gigabit Ethernet repeaters.

Menachem Abraham, chief executive officer and president of Prominet Corp., based in Westborough, Mass., said it does not make sense to have ATM in the LAN backbone when the desktops are Ethernet. "Because Ethernet will be the dominant desktop technology for many years to come, the most natural thing to do is just keep Ethernet everywhere on the campus by deploying switching at gigabit speeds on the backbone," he said.

Abraham, previously chief technology officer at Chipcom Corp., said his company is developing a range of gigabit Ethernet products.

Prominet will design switches for workgroup and wiring-closet environments that support several 100M bit/sec ports with one or two 1G bit/sec ports for server and backbone links.

For the data center, the company will offer a multigigabit switch that will aggregate all of the gigabit Ethernet connections.

Packet Engines and other gigabit Ethernet start-ups such as Rapid City — founded by Joe Kennedy, former CEO of Hughes LAN Systems, Inc., — may also make 1G bit/sec network interface cards in order to get the market moving. ■

IDC INSiGHT

SPECIAL ADVERTISING SUPPLEMENT

AN INDUSTRY UPDATE WRITTEN BY INTERNATIONAL DATA CORPORATION AND SPONSORED BY NOVELL, INC.

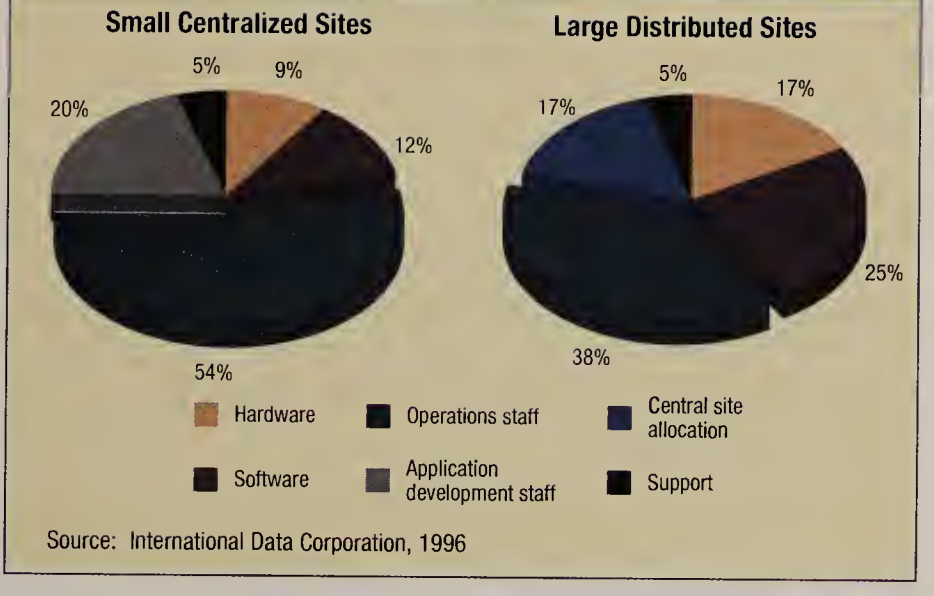
Meeting the Challenge of Client-Server Computing

Maximizing Return-on-Investment of Network Computing

The migration to client-server computing is affecting organizations both large and small almost everywhere on the planet. Computer users today have extensive access to global network-based resources, including communication gateways to other companies, individuals, and markets worldwide. Signs of this connectedness abound:

- Last year the number of LAN users worldwide hit nearly 100 million, double the number in 1993. By 1999 the number will double again
- In the same year the number of people in the world with electronic mail boxes topped 40 million. By 1999 the number will be over 125 million
- Groupware users numbered over 30 million worldwide by the end of 1995; by 1999 they will number over 250 million

Figure 1 — The Hidden Costs of Client-Server



Source: International Data Corporation, 1996

So we are heading for a wired workplace, a wired marketplace, even a wired society. However, there is a price to be paid for all this connectivity. The nearly universal implementation of client-server systems requires living with new levels of complexity and new hardware and software that people must be trained to use. Moreover, highly skilled personnel must be hired to install, manage, maintain, and administer these far-flung networks. The result is that staffing costs have become the largest contributor to total networked computing costs, regardless of the size of the installation (see Figure 1).

Until now, companies have justified the costs and complexities of client-server computing by competitive advantage–it is a very flexible and adaptable computing style. But when client-server is the norm, where will the competitive advantage lie?

IDC believes that companies that learn to manage their networked resources through technology and training will win out over their peers in the long run. Companies that understand the true costs and true benefits of client-server computing will generate quicker return for their investments. Companies that relentlessly optimize, integrate, and upgrade existing systems will stretch IT resources further and be able to reinvest sooner than competitors taking a wait-and-see approach.

Areas of Opportunity

IDC and Novell have teamed to produce this White Paper in order to help IT managers develop a strategy for maximizing return on investment in networked computing resources. It is the executive overview of three studies researched and written by IDC and sponsored by Novell. In the research it conducted,

Driving Down Networking Costs

GroupWise:

Typical annual return-per-user of 334%

Nearly $400,000 a year saved in phone costs at Farmland Foods

Courier costs cut $16,000 a year at Sheppard, Mullin, Richter & Hampton

NetWare 4:

On average 15% less expensive than NT Server from Microsoft

50% increase in users supported by a single server

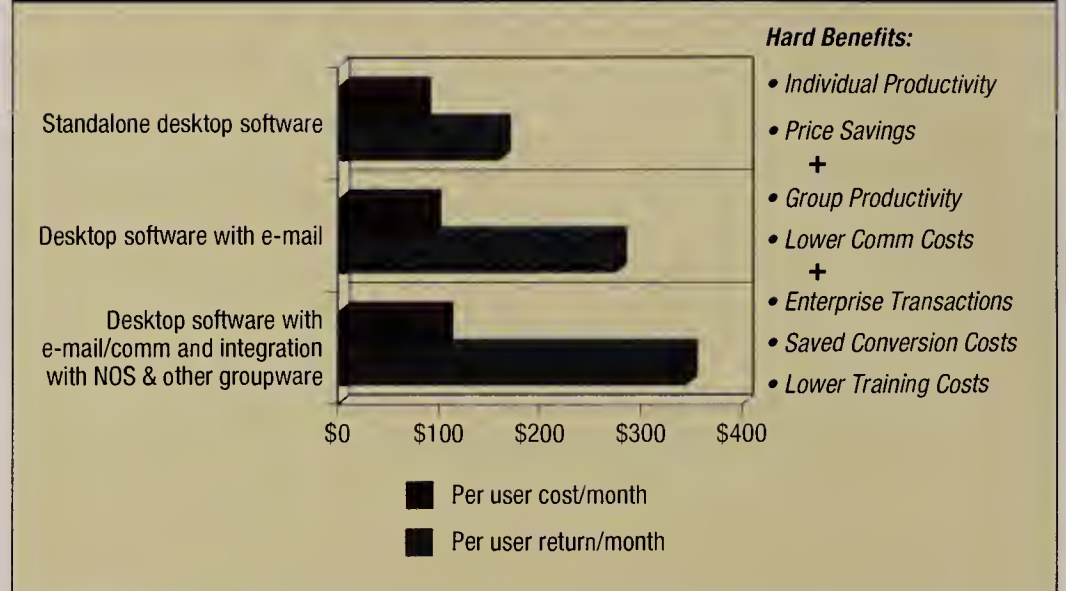
ManageWise:

$95,784 savings in business efficiency per 100 users

50% reduction in network downtime

19.7 day payback

Figure 2 — The Investment Leverage from Groupware



Source: International Data Corporation, 1996

IDC found three areas of networked computing that are focal points for ROI leverage:

1. The choice and use of communication applications such as e-mail and groupware
2. The choice and use of next-generation network operating systems
3. The use of advanced network and system management tools

In addition, IDC found that when products in support of all three of these areas work together in an integrated fashion—such as Novell's GroupWise, NetWare 4.1, and ManageWise products—benefits are compounded. Support and training costs are lower, conversions and upgrades occur faster, applications come on stream sooner, and downtime is reduced.

Applications for the Next Wave

The migration to client-server computing is a quest to provide users with access to information and computer resources beyond their desks. One of the key tools for this is groupware software, epitomized by Novell's GroupWise, software which integrates e-mail with scheduling, calendaring, and other workgroup oriented functions. The market for groupware is exploding as organizations find they can use it—specifically the e-mail function—as a platform for providing workgroup and even enterprise-wide access to information and resources.

In the research IDC conducted, almost half of the business benefits organizations received from migrating to groupware came from better internal and external communications. For instance, Farmland Foods, a $2 billion dollar meat processing company, found that since installing GroupWise, documents once faxed in 15 minutes now take less than five to e-mail. Further, the use of GroupWise saved almost $400,000 in voice phone calls a year.

Figure 2 illustrates how electronic communication and collaboration generate cascading benefits. Standalone desktop software can impact individual productivity, but when combined with e-mail, that software can improve the productivity of a whole workgroup, not just the individual user. If the e-mail is specifically designed to work with the desktop software and with the network software, as say Novell's GroupWise is with NetWare 4.1, then those workgroup benefits are compounded.

This efficiency pays real dividends. When Sheppard, Mullin, Richter & Hampton, a Los Angeles law firm, made the move to GroupWise it found the support ratio for lawyers dropped from one assistant for every two lawyers to one for every three. GroupWise scheduling cut countless hours in tasks as routine as setting up meetings; GroupWise e-mail cut courier costs by $16,000 a year.

For most companies, an investment in groupware is considered an incremental cost. The hardware is already in place, as is the network. Moreover, the support costs—which account for more than 50% of the cost of operating a networked PC—are shared across dozens of applications.

But even with all the hardware, network, and support costs amortized across the groupware software, it's a bargain. IDC's research with Novell's GroupWise customers found that a typical installation required only about $250 in fully-loaded first-year costs—less than 5% of the annual cost of operating and supporting an end-user personal computer.

For that $250 investment, those same GroupWise customers found that their first-year return was over $800 on lowered communication and clerical costs alone. Meanwhile, they accrued an array of other concrete benefits, such as fewer meetings (and thus less travel and meeting administration), easier document handling, and so on. For every single GroupWise customer interviewed by IDC, return-on-investment exceeded expectations.

Modernizing the Network

If the LAN is the heart of client-server computing, then the network operating system is its soul. As LANs have evolved from peripheral information systems to the primary components of mission-critical systems, they have become more robust and more scalable. Along the way they have also provided IS personnel with the tools to manage network resources as never before.

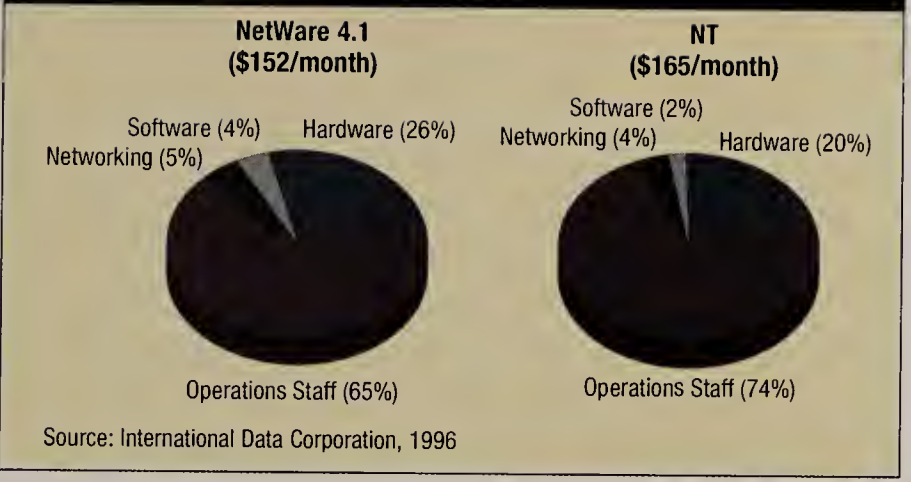
In fact, powerful new management capabilities are why many people are migrating to NetWare 4.1. With more than 375,000

licenses installed worldwide as of 1995, it is the most popular network operating system. Three key reasons for its popularity are:

- Greater functionality
- Improved management
- Directory services

Figure 3 illustrates how survey respondents believe migrating to NetWare 4.1 has enhanced network productivity—with ease of administration at the top of the list, mentioned by nearly 40% of respondents. NetWare 4.1's greater functionality has promoted companies' reliance on LANs and delivered on the ultimate promise of client-server—increased productivity.

Figure 4 — Network Cost-to-Use at Medium (300 User) Sites (Costs After Migrating from NetWare 3.X)

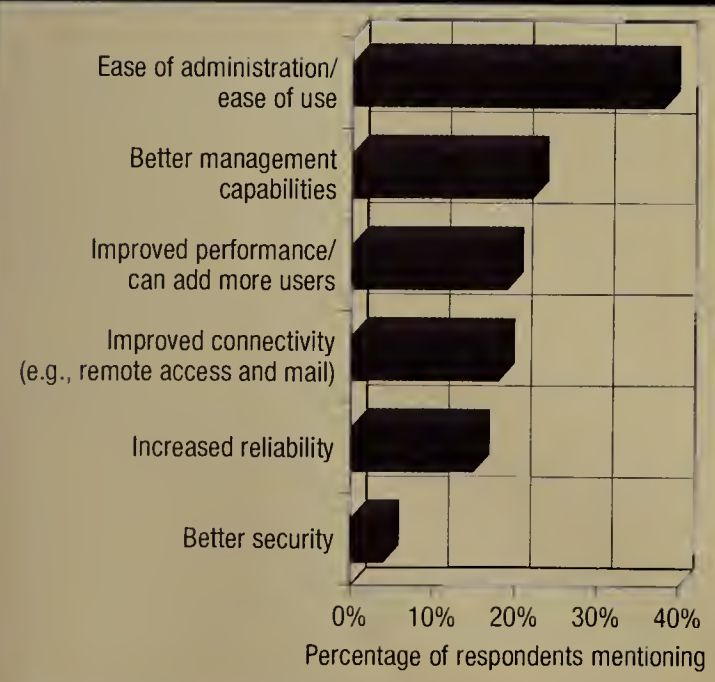


Source: International Data Corporation, 1996

According to recent surveys conducted by IDC, LAN managers report remarkable improvements in managing their networks under NetWare 4.1. Although they expected the number of nodes on their networks to grow by 260% in the 12 months following installation, they anticipated the number of file servers on the network would grow by only 163%. In other words, under NetWare 4.1, they expect to increase the ratio of users per server from 41 to 60—an improvement of 50%.

In addition to increasing the number of users per server, NetWare 4.1 provides a single point of administration with Novell Directory Services (NDS) that results in a lower cost of network administration. Figure 4 shows how, in medium-sized sites, NetWare 4.1 generates 14% lower network administration costs than Microsoft NT, primarily by increasing the user to support staff ratio.

Figure 3 — How NetWare 4.1 Improves Network Productivity



Source: International Data Corporation, 1996

Novell and other networking companies have set their sights on developing new technologies that will make tomorrow's networks more efficient and flexible. Novell has developed a Smart Global Network strategy, which entails making the network available to anyone—anytime, anywhere. An essential component of the Smart Global Network is Novell Directory Services (NDS), which enables companies to keep track of and connect all of a network's users, workgroups, hardware and software on one common access and administrative framework. NDS provides directory services technology that can handle the management of countless resources on heterogeneous systems spread around the globe. Also fundamental to Novell's vision of the future is an open set of application programming interfaces (APIs) that will make it easy to incorporate NDS and other NetWare 4 networking services into distributed applications.

Providing End-to-End Network Management

Staffing costs and end-user productivity are the issues that keep IS managers awake at night. And that has never been more true than it is today. As networks expand and intertwine, the critical success factors for network managers will include:

- Increasing network uptime, both in operation and when installing new users or applications
- Increasing efficiency by supporting rapid network growth without commensurate growth in staff
- Increasing responsiveness, fixing problems in a way that minimizes idle time for users or within business processes

To meet these needs, Novell offers ManageWise. It combines both network management and PC administration into a single, integrated package. Previously, most PC administration and LAN management products worked independently of one another, each requiring dedicated staff and resources.

ManageWise is the integrated solution that offers a single view of the network. It provides analysis tools for understanding bottlenecks; permits the configuration, inventory, and diagnostics of PCs from a single local or remote site; and provides tools for monitoring and managing remote and local servers. IDC's research demonstrates that even small and medium-sized companies can achieve significant cost savings by implementing ManageWise (see Figure 5). Network managers found that the most significant gains in efficiency were realized in server operation and help desk functions. Using ManageWise also increased LAN manager responsiveness. Before implementation, only 30% of network or end-user problems could be solved from a central site; afterwards, that number rose to 60%. This is especially important for companies with highly decentralized operations.

Figure 5 — Average Annual Savings From ManageWise

Source: International Data Corporation, 1996

Since the software-licensing, maintenance, and training costs of a product like ManageWise are low compared to the number of users potentially affected, the return on investment can be surprisingly high. Across the survey base polled by IDC, ManageWise paid for itself on average within 19.7 days.

For every 100 users, implementing integrated management with ManageWise saved $95,784 annually. These savings are attributable to the following:

- More efficient systems management, including an increase of 33% in the number of servers and 25% in the number of PCs a staff person can support, and a decrease in travel of 53%, leading to annual cost savings of $14,500
- Significant reductions in the time required to perform key management tasks—such as five hours in moves and changes, nine hours in server maintenance and configuration, seven hours in help desk and support, four hours in problem tracking, three hours in printer maintenance, etc.—saving $30,844 annually
- Dramatic reductions in network downtime (over 50%) due to network outages, delays addressing problems at the desktop, or time spent installing and configuring applications, generating annual savings of $50,440

Cost-Savings and Client-Server: They Aren't Mutually Exclusive

Believe it or not, return on investment in networking can be quantified. While it may sometimes seem that networks are growing out of control, vendors like Novell are in fact working diligently to develop products for simplified, easily managed local, wide-area, and global networks. Because of the strategic and financial advantages of networking wherever systems reside and users roam, organizations will be forced to expand the reach and complexity of their networks simply to remain competitive.

Astute companies will concentrate on migrating to client-server computing in ways that maximize both the resources available to run networks and the effectiveness of those who ultimately generate revenues and profits—namely, end users.

Call to Action

This is an executive overview of a three-part series of White Papers entitled:

- Novell GroupWise: Leveraging Desktop and Network Investments
- Novell NetWare 4.1: Reducing Cost of Ownership
- Novell ManageWise: Maximizing Returns on Networking Investments

For a free copy of the Novell Business Advisor containing tools that help you assess return on investment with NetWare, MangeWise, and GroupWise, as well as electronic versions of the IDC White Papers, call 1-800-665-4586 or visit either the Novell home page at http://www.roi.novell.com or the IDC home page at http://www.idcresearch.com

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Briefs

■ **Gandalf Technologies, Inc.** *has rolled out a raft of enhanced products for end-to-end* **remote access** *applications. The enhancements include encryption software for ensuring privacy of data transmission over remote links; support for frame relay, ISDN Primary Rate Interface, Bandwidth Allocation Control Protocol and Point-to-Point Tunneling Protocol in Gandalf's XpressWay concentrator; an ISDN Basic Rate Interface terminal adapter for PCs; and an eight-port 10Base-T ISDN router/hub for the XpressConnect product line.*

The frame relay enhancement for the Xpressway concentrator costs $3,495; the dual-port ISDN PRI card costs $6,995; the ISDN card for the XpressConnect line costs $349; and the 10Base-T router/hub costs $995. Gandalf also rolled out a modem module for XpressWay priced from $2,350 to $3,995.

Gandalf: (613) 274-6500.

■ **Livingston Enterprises, Inc.** *has unveiled* **Internet access control** *software that filters requests for content according to predefined authorization.*

Livingston's ChoiceNet software resides on a server instead of every PC, which is what some competitive offerings require. It includes a customizable Internet content control list to enforce access authorization or denial to specific sites.

ChoiceNet will be a standard feature of all Livingston routers and access servers beginning in May. It runs on a variety of Unix servers.

Livingston: (800) 458-9966.

■ **U.S. Robotics** *has announced Sportster Voice, a 33.6K bit/sec* **fax/modem** *that includes a full-duplex speaker phone and voice mail with multiple mailboxes.*

The PC internal model costs $239, and the Macintosh external model costs $279. Both are shipping now.

An external PC model, priced at $279, is scheduled to ship later this month.

U.S. Robotics: (708) 676-7010.

General Signal sheds new backbone light

By Michael Cooney
Shelton, Conn.

Users looking to increase the fiber in their networking diet may want to sample new products from General Signal Networks.

The company last week announced a new fiber-optic multiplexer and management system that promises to reduce line costs and let users more easily track resources in fiber-based enterprise networks.

The company rolled out the Optimum/9000, or OM/9000, a multiplexer that employs wavelength division multiplexing (WDM) to transmit large volumes of data, video or voice over a fiber backbone. WDM uses the colors of light, or optical wavelengths, to send data over a single fiber channel.

Where will WDM lead? Read an essay on its implications on Network World Fusion. Select News+ then WANs & Internetworking.

It works by bringing together multiple datastreams from PCs or video cameras and converting their data into distinct colors before transmitting across a single channel on a fiber backbone. A second mux is required at the other end of the link to convert that optical data back into its original form.

The OM/9000 can support as many as four devices — such as PC servers, tape drives or cameras — over a single fiber-optic channel at speeds up to 200M bit/sec for as far as 10 miles.

The box is positioned as a backbone node for large end users that have existing fiber-based backbones and need to increase their bandwidth. It is also aimed at those that have lots of unused "dark fiber" that they would like to begin exploiting.

While it will compete with IBM's MuxMaster WDM-based product, the OM/9000 is more of an end-user product, analysts said. The IBM MuxMaster supports up to 10 devices, and the firm claims that transmission speeds of up to 622M bit/sec are possible at distances of less than three miles. IBM positions the MuxMaster as a backbone node for users and as a device phone companies could deploy to help roll out fiber services.

"We see WDM as a cost-effective way for users to add bandwidth and see a return on their investment in three to five years," said Peter LaPorte, vice president of marketing at General Signal. "Multiplexing fiber optics is an easy way to gain extra capacity as users expand enterprise environments and distribute applications such as on-line backup, disaster recovery or distributed databases."

The OM/9000 is available for prices starting at $80,000.

The company also unveiled a turnkey package of fiber-optic products and services for users interested in building new fiber backbones or more easily managing existing environments.

The Intelligent Fiber System (IFS)/ 9000 includes a PC-based application that can track the location of devices linked to fiber-optic lines and mainframe channel extension products.

"We'll design and build the entire fiber enterprise and manage it once it's installed," LaPorte said. "If users have existing fiber backbones, we can use our management applications to help track and resolve problems quicker."

The IFS/9000 offering is available now. Pricing is based on how much of the customizable services and products the user deploys.

©General Signal Networks: (203) 926-1801.

GENERAL SIGNAL SHEDS LIGHT ON MUXES

The OM/9000 uses wavelength division multiplexing to transmit the output from up to four devices over a single fiber.

Applications automatically fetch users

By Joanie Wexler
Los Altos Hills, Calif.

The alphanumeric pager is gaining credibility as a key enterprise communications device.

Its latest boost comes from start-up Personal Productivity Tools, Inc. here. The firm recently launched EtherPage, software that works with Unix servers to let clients of all types — including users on the World-Wide Web — send messages to pagers.

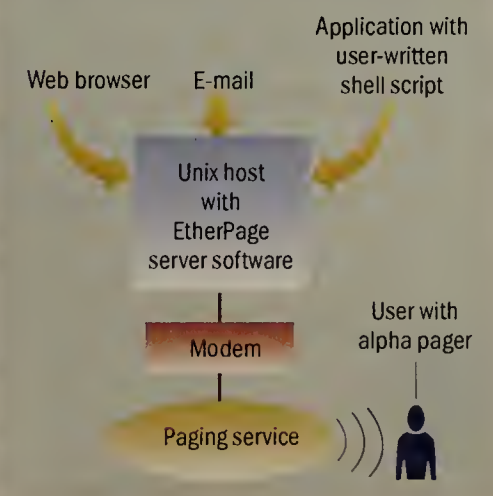
The software can also be integrated with other applications to automatically notify users when certain conditions are reached on their enterprise nets. This is particularly useful in help desk, network monitoring, oil and gas, health care and stockbroker applications, said David Coelho, president of Personal Productivity Tools.

Users can write shell scripts so they will automatically be paged when a particular company hits a certain stock price, for example, or the network capacity reaches a certain threshold, he explained.

This gives them the freedom to leave their desktop computers without worrying about missing important alerts, Coelho said.

Automatically on call

EtherPage automatically forwards messages from various applications to alpha pagers.



For example, Hewlett-Packard Co. in San Jose, Calif., uses EtherPage for internal network support. "Basically, when a network device goes down, we get automatically paged [by the network management software]," said Craig Cirimele, HP network engineer.

Cirimele wrote some shell scripts to tie the system with the company's OpenView enterprise net management product. Each took about half an hour to write.

The HP Unix support staff also uses EtherPage. "If a print job sits in a spool too long, somebody gets paged," Cirimele explained. This means problems are headed off at the pass, rather than waiting until a frustrated user calls, he said.

Cirimele said the company sent about 10,000 pages last month through the system.

License fees for EtherPage range from $595 to $2,195 per server. There are no client license fees, and there is no limit to the number of clients allowed to access a server.

Other players in the computer paging arena include Ex Machina, Inc., which offers software development kits that allow third-party or in-house developers to embed paging functions in their Unix, Windows, Macintosh and other applications. The firm also lets users send pages from their Unix Web servers.

Another company, Notable Technologies, Inc., makes software that lets users send alpha paging messages from the Web or their desktops. Unlike Personal Products, Notable bundles the pager, software and service subscription to either Paging Network, Inc. or SkyTel Corp.

©Personal Productivity Tools: (415) 917-7000.

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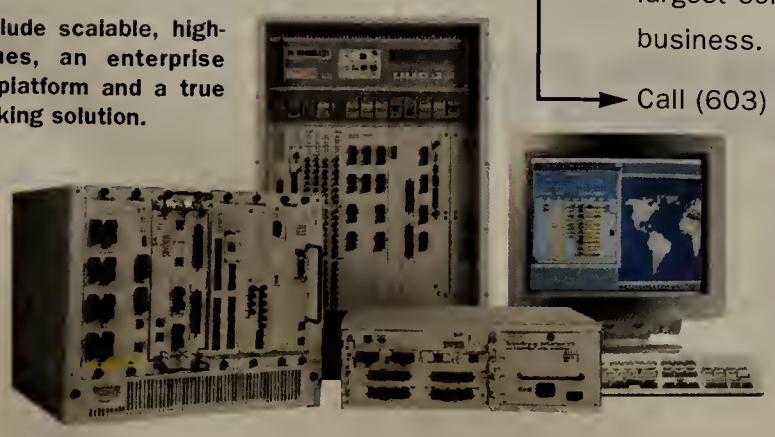

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INTERNETWORKING MONITOR

Scott Bradner

Importance of restrained anarchy

A little bit of anarchy has been critical to the success of the Internet.

In fact, there has been a rare freedom to experiment on the Internet. This experimentation, though, has not been with the IP "bearer service" (as the book *Realizing the Information Future,* referred to in my last column, described it). IP runs over everything, it seems, from carpet static to ATM (some would claim that much of ATM is marketing static), and provides a common interface between a multitude of applications and transport media.

The nonpresence of government or industry-mandated application standards has allowed new applications like th World-Wide Web to be developed an adopted. In a more orderly world, ne applications would be developed throug a standards process that, by careful anal sis of the problems and careful evaluatio of the suggestions, does its best to inhib individual innovation. This is not to sa that standards are bad. The only way to g widespread adoption of any technology through the use of standards.

The problem is that standards som times become exclusive — nonstandar ized technology is not permitted. Th Internet has not suffered from an ove abundance of mandated standards. Th attitude of flexibility, bordering som times on anarchy, is crucial to the conti ued dynamic evolution of this co nectivity service we call the Internet.

But all cannot be so ad hoc. For exar ple, unique IP addresses are required l all sites that exchange traffic over t 'Net. This does not mean all IP address must be assigned by a single organizatio but it does mean there must be coordin tion between all organizations that assi IP addresses to ensure duplicate a dresses are not given out.

Another area in which there must coordination is the registering of doma names. Domain names are hierarchica assigned. The right-most compone known as the top-level domain (TLD), h global significance; the next compone known as a subdomain, has significan only within the specific TLD. It wou seem clear that at each point in this hier chy, there must be only one organizati registering domain names or, if there more than one, there needs to be cl coordination between the organizatio If this is not true, it would be quite easy get duplicate registrations — two h vard.edus, for example — and it would impossible for an Internet client to kn which was the one they wanted.

But this clear logic seems to be esc ing some people on the 'Net, since n TLDs are being announced without a coordination. When the InterNIC start charging the apparently usurious fee $50 per year per subdomain, too ma people on the 'Net went a bit nonlinear

New TLDs called .biz, .usa and oth have been announced in the last weeks. In addition to the obvious tech cal problem that almost no one can ac ally use the new TLDs because th nameservers do not point to a mas nameserver that includes them, ther the basic question: What gives these p ple the authority to create them?

A bit of anarchy helped create Internet of today, but that anarchy nurtured by people who had some exp ence in technical and organizational nas — clues apparently lacking in som the 'Net activists these days.

Disclaimer: Although Harvard has bee the forefront of restrained anarchy (at between schools) for centuries, the above ar own opinions.

Bradner is a consultant with Har University's Office of Information Techno. He can be reached via the Interne sob@harvard.edu.

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Circle Reader Service #63

HP 'productizes' asset mgmt. service

By Jim Duffy
Palo Alto, Calif.

Hewlett-Packard Co. last week unveiled software to help companies better manage their technology assets.

HP rolled out HP AssetView, a client/server application that allows users to keep track of as many as 400 attributes of PCs, servers, printers and network equipment. On a PC, for example, such attributes would include the make, model, location, configuration and service history. The AssetView software is an outgrowth of HP's Asset Management Services, an outsourcing offering that debuted in October 1994. These services enable customers to outsource their entire asset management program to HP.

Analysts said AssetView software will induce users to seek out such services when they find out how much attention asset management requires.

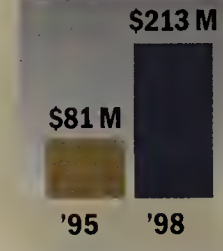
"Customers who prefer to carry out the asset management tasks on their own at some point realize that they might be better off having somebody provide some or all of those services," said Doug Chandler, senior analyst at International Data Corp. in Framingham, Mass. "[AssetView] is a way for HP to get into some new customers that they might not have gotten into with only the service."

With AssetView, HP is trying to address problems companies have controlling costs and maximizing returns on technology investments. If they cannot keep track of these resources, companies are likely to unnecessarily purchase, upgrade, service and dispose of equipment.

AssetView includes a Sybase, Inc. relational database, a report writer and a runtime package. Using proprietary HP agents on managed devices, AssetView can poll devices at scheduled intervals to gather hardware and software configuration data. For users desiring standard compliance, AssetView can map this information to the Desktop Management Task Force's Desktop Management Interface format. Information on system warranty, service and depreciation, meanwhile, can be mined from other databases or entered manually into AssetView's database.

Once this information is entered, users have a central database with which to keep tabs on and quickly update asset data.

The U.S. asset management services market will grow from $81 million in 1995 to $213 million in 1998, according to IDC in Framingham, Mass.



In addition, AssetView can collect data from Microsoft Corp.'s Systems Management Server software for configuration of Windows clients and servers, and can be launched from HP's OpenView network management platform, said Mandeep Khera, worldwide operations manager for HP's Asset Management Operation.

Companies can use AssetView to provide better and more efficient service, determine how to achieve the best return on investment and plan for upgrades.

In addition, net administrators and help desk workers can access AssetView on-line for real-time information, such as service history or network configuration.

Pricing for AssetView starts at $22,000. It is available now.

Separately, HP launched two products to help users remotely control and monitor Asynchronous Transfer Mode nets. The first product, Broadband Service Analyzer, collects multilayer performance metrics on ATM links so users can understand how their nets are behaving.

The second product, Broadband Launch Pad, is a Unix software application that allows users to select and launch the graphical user interface of any analyzer, regardless of vendor.

Broadband Service Analyzer costs from $39,300 to $79,995. The single-port version will be available in June. The Broadband Launch Pad costs $4,995 and also will be available in June.

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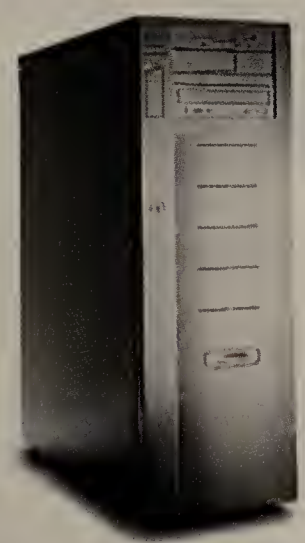

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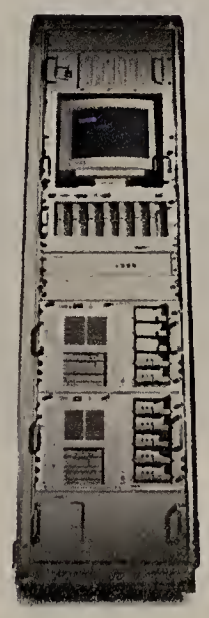

Compaq ProLiant 4500 Rack

COMPAQ

Has It Changed Your Life Yet?

Firms target Internet, intranet mgmt.

By Jim Duffy

Two providers of network management products and services want to be your partner for setting up and surveying Internet use and intranets.

On the services side, I-NET rolled out Managed Internet Service, or MINTS, for companies looking to outsource Internet, intranet and World-Wide Web management and service establishment.

On the products side, Seagate Enterprise Management Software, Inc. announced Seasurf, a suite of software for monitoring Web usage and correcting faults.

"The Internet itself is no different than other kinds of [media] that need to be managed, as well, particularly relative to security, access and who's doing what to whom," said Charles Robbins, vice president of data communications research at Aberdeen Group, Inc. in Boston.

I-NET's MINTS is designed to help corporations deploy and optimize Internet access for both internal and external users. Under MINTS, I-NET will design, develop and remotely manage all Web services and home pages.

In addition, MINTS offers Web site and home page authoring and hosting, intranet development, custom reports on Web usage and hits, and Internet end-user support.

"There is a frenzy among vendors to capture the enterprise marketplace for intranets," said Blane Erwin, senior analyst at Forrester Research, Inc. in Cambridge, Mass. "I-NET is the first of what Forrester expects to be a wave of outsourcing firms that jump into this, as well."

MINTS is available now, and pricing is based on traffic volume.

Seagate's Seasurf, meanwhile, is targeted at end users opting to manage their intranets themselves using Hewlett-Packard Co.'s OpenView or Cabletron Systems, Inc.'s Spectrum platforms. Seasurf includes so-called behavior models that work with Seagate's NerveCenter Pro event correlation system to quickly pinpoint the root cause of failures, outages and abnormal activity.

Seasurf includes two such models: one for firewall security and one for monito

ing Web servers. The Internet secur behavior model allows NerveCenter P to cross-correlate data collected from t FireWall-1 network security software fro CheckPoint Software Technologies, L Based on this data, NerveCenter Pro c automatically launch actions that enfor corporate policies for access to the Int net and the enterprise network.

A network manager, for example, c configure NerveCenter Pro to issue alert when the firewall has detected pers tent attempts by an unauthorized user access the corporate network.

The Web server behavior model c lects performance data from Micros Corp. and Netscape Communicatio Corp. Web servers through intellige agents that monitor information logg by the servers. NerveCenter Pro can th correlate this data to detect overload servers and redirect data to other av able servers.

Both behavior models will be availa in June free of charge to current users NerveCenter Pro.

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I-NET's MINTS provides:

- Remote hosting and management of Web sites and servers
- Internet firewalls and encryption
- Internet/Web site content authoring
- Custom reports on Web usage and hits
- Intranet development and setup
- Internet help desk and end-user support

Seagate's Seasurf provides:

- Behavior models for policy and firewall deployment, and performance monitoring across Web sites
- Fast-reasoning engines, agents and applets for monitoring and correcting faults
- Web, Unix and Windows NT user interfaces

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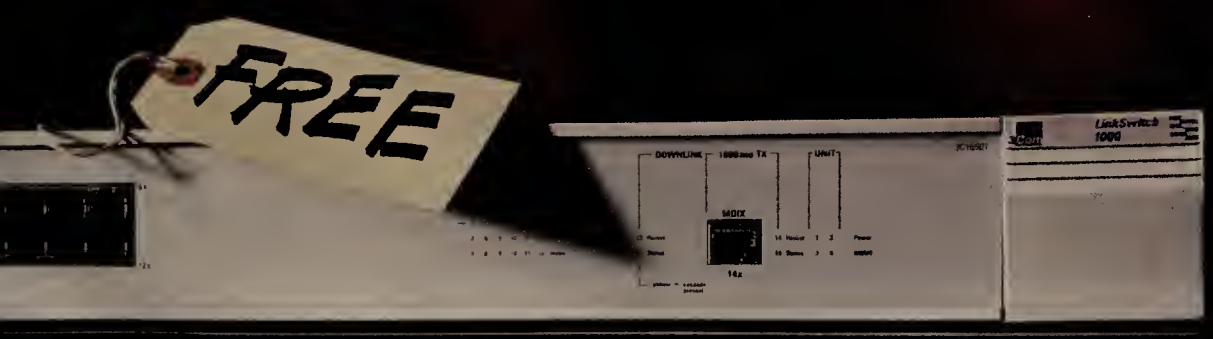

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Token Ring	#1
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ATM	#2
ROUTERS	#2
REMOTE ACCESS	#1

Source: Recently published reports from Dataquest, IDC, and/or Dell'Oro Group.

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Carrier Services

Covering: Local and Long-Distance Services • Value-Added Networks • Cable, Satellite and Wireless Networks • Regulatory Affairs • Carrier-Based Internet Services

Briefs

■ **Scitor,** *the international value-added network, and* **WorldCom,** *an on-line* **Lotus Notes service** *provider, have agreed to collaborate on distributing the WorldCom service. WorldCom already uses the Scitor network to support its service, but now Scitor also will market the service.*

■ **LDDS WorldCom** *said it has made a $500 million commitment for new equipment from* **Northern Telecom, Inc.** *to upgrade its network. Included in the three-year contract are Synchronous Optical Network (SONET) transport gear, optical amplifiers and network management software.*

■ **AT&T** *has launched the first fiber-optic private-line service between the U.S. and* **Russia.** *The service is priced about 10% above comparable satellite links, AT&T said. Until now, satellite links have been the only feasible choice between the two countries, according to Norm Collins, AT&T's managing director for transport services.*

■ **MCI Communications Corp.** *announced that it has completed* **Synchronous Optical Network (SONET)** *rings around Cincinnati, Dallas, Detroit and Seattle. MCI now has 17 regions configured with SONET ring technology, and 70% of its U.S. traffic now operates in a SONET environment, according to John Gerdleman, president of networkMCI Services.*

Separately, MCI has entered into an affinity marketing agreement with **Konica Business Machines U.S.A., Inc.,** *based in Windsor, Conn. MCI said it will offer outbound, inbound, conferencing and data services to Konica's customers at a discount.*

Also, MCI has inaugurated switched 64K bit/sec with Telinor, the international carrier of **Argentina.** *The service provides basic rate ISDN in multiple segments of 128K bit/sec for use in batch file transfers, videoconferencing and multimedia applications.*

FCC proposes multiple interconnection points

By David Rohde
Washington, D.C.

When AT&T comes calling next year to sell you local telephone service, which of the following will the company have to own: the wire out from your premises; the local switch; the signaling database that enables caller ID; all of these; or none of these?

Any of the above, according to a far-reaching policy under development at the Federal Communications Commission.

The FCC has issued a preliminary proposal to force Bell companies and other local exchange carriers (LEC) to interconnect with new competitors at a series of specific points.

If finalized, the proposal would clear the way for local competitors to enter the market through what AT&T officials call a mosaic of methods, ranging from pure resale to a complete alternative local network.

But the pure resale option may not prove very attractive because it appears the FCC will not force LECs to provide wholesale discounts to local resellers at anything close to the 25% demanded by AT&T Chairman Robert Allen just hours after President Clinton signed the Telecommunications Act of 1996.

All or nothing

Under the new law, Congress requires LECs to interconnect with competitors at "any technically feasible point" but left it up to the FCC whether to specifically define those points under a single national standard. Congress also gave the FCC the option to allow states to create variations based on local conditions.

But in the FCC's proposal, commissioners said a specific, national standard would make things easy for equipment manufacturers that sell gear to new and existing carriers. They added that "concrete national standards" also make sense because they would limit the natural advantage big LECs would otherwise have in negotiating with new local carriers.

AT&T has already asked the FCC to define 11 points where LECs must provide interconnection in the local exchange (see Figure 1). While LECs have asked for as few as three points overall, AT&T asked for three points alone between the LEC central office switch and the customer premises — the so-called local loop. The FCC said it has tentatively concluded that AT&T is correct on that score.

Under LEC proposals, AT&T would have had to make an all-or-nothing decision as to whether to build an entire local loop to each customer or buy the entire loop on resale, said Gerry Salemme, AT&T's vice president for federal government affairs.

To head off disputes after implementation, the FCC said it may institute two benchmarks to determine whether interconnection is working. One would assess whether a user could perceive any difference in the quality of service between competing carriers. Under this test, AT&T

See **FCC,** *page 32*

FIGURE 1: A LA CARTE TO THE MAX

AT&T is pressing the FCC to order local carriers to unbundle 11 separate elements of the local exchange, so that new local carriers can buy one, some or all from the current carrier.

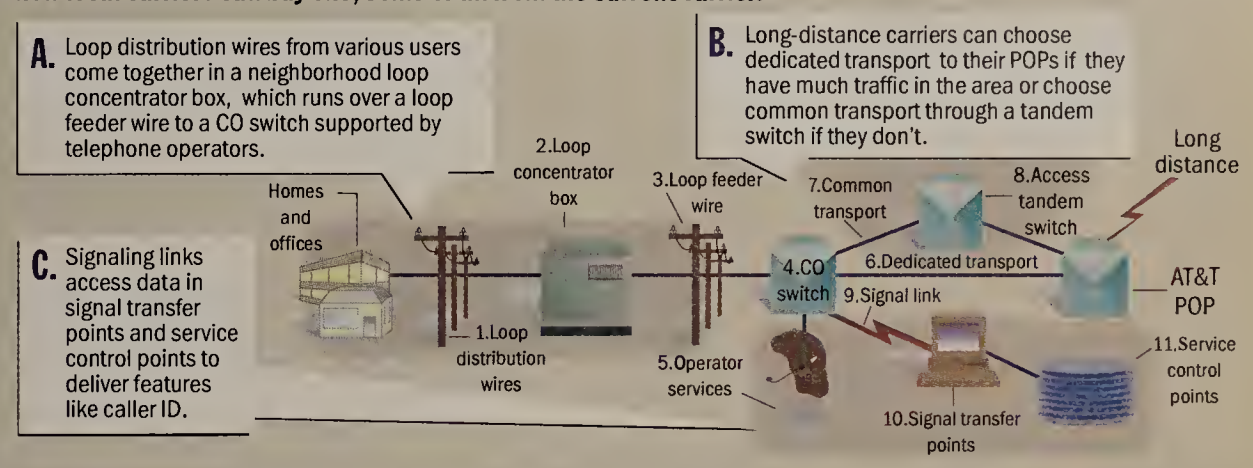

FIGURE 2: IN YOUR DREAMS

Recent orders by state regulators and filings by local carriers show it is highly unlikely AT&T will get the 25% wholesale discount it's demanding for resale of local services:

State	Carrier	Business resale discount to AT&T	Residential resale discount to AT&T
California	Pacific Bell	17%	10%
California	GTE	12%	7%
Illinois	Ameritech	10%	6%

SOURCE: FCC, WASHINGTON, D.C.

Prudential to now dial AT&T

By Joanie Wexler
New York

Prudential Securities, Inc. has become a distributor for AT&T's WorldNet Internet dial access services.

The two companies recently announced that Prudential customers wishing to tap into Prudential Online, the securities firm's 'Net-based account access service, can do so by ordering AT&T WorldNet services from their Prudential financial advisor.

Prudential Online was launched in January as part of Prudential's World-Wide Web site. The service lets clients view the daily status of their accounts.

For clients who do not already have 'Net access, Prudential is making WorldNet dial access services available for $19.95 a month — the same price AT&T charges, said Prudential spokeswoman Susan Atran.

Netscape Communications Corp.'s Navigator browser, available at no extra charge, will be preconfigured to make Prudential Online a users' default home page.

For protection, Prudential will supply Secure Sockets Layer software that encrypts all data when clients access their account information on Prudential Online.

Another part of the company's Web site is the Virtual Branch Office, which includes daily market updates and help for individuals evaluating their investment personalities.

Prudential WorldNet customers will have access to the Virtual Branch Office and the rest of the 'Net.

Distributing 'Net services through companies that want to package their services is catching on, with nationwide Internet service provider (ISP) Netcom Communications, Inc. leading the pack, said Eric Paulak, research analyst at Gartner Group, Inc., a research firm in Stamford, Conn.

But users need to be careful when signing a contract with someone other than the actual provider, Paulak said. "A key concern is what service support you're going to be able to get from the actual ISP," he said. "If you sign the contract with the distributor, good luck when you have problems."

Prudential said its WorldNet customers will have their own toll-free number directly into WorldNet. ■

Cascade buys Arris for dial-up

By Tim Greene
Westford, Mass.

Cascade Communications Corp. made a purchase last week that will help satisfy user demand for dial-up access to corporate LANs and the Internet.

Once it incorporates a new product it is acquiring with the purchase of Arris Networks, Inc., Cascade will be able to offer service providers a less expensive way to give users analog and ISDN dial-up access to frame relay services.

At the same time, the product will allow carriers to push frame relay to the edge of their networks, making them faster by jumping traffic onto fast-packet backbones as soon as possible. Previous solutions offered by Cascade included low-end frame relay access devices that would sit in remote offices and allow users to dial in to frame relay networks via ISDN.

Arris has in its labs a stand-alone access shelf with room for more than 500 ports that handle either analog or ISDN traffic. The shelf concentrates the traffic and puts it out the back through a 45M bit/sec frame relay or Asynchronous Transfer Mode interface.

The device is scheduled to be availab by the end of the year.

This kind of access concentrator fille a gap in Cascade offerings. Current dia up access for Cascade's B-STDX switch offers 48 ports for ISDN only, according Daniel Smith, chief executive officer Cascade.

According to John Coons, an analy with Dataquest, Inc. in San Jose, Calif., th new device will give carriers with Casca switches the ability to rapidly scale up di access services.

CASCADE BOUGHT WHAT?

Arris Networks, Inc. of Westford, Mass.

Price: $145.3 million in stock

Founded: 1995

Employees: 25

Principal asset: 500-plus port dial-up access device for Cascade's frame relay switches

It will also make it easier for Intern service providers with frame relay bac bones to switch dial-in traffic. Incomi calls will not have to pass through a rout before being fed onto the switch.

Cascade has been moving in that dire tion with the HyperPath ISDN card for t B-STDX, which supports ISDN dial-i access directly to the switch, eliminati the need for stand-alone access conce tration devices (*NW*, Feb. 26, page 15).

But that product did not have addr analog calls, Coons said. With the n Arris product, carriers can offer bo kinds of dial-up without having to go wi another vendor's access device that ha different management platform than t Cascade gear.

Once the dial-up traffic is in the swit it can be directed to a frame relay servi feeding a corporate net, for example.

✆ Cascade: (508) 692-2600.

FCC

Continued from page 31

would win access to signaling links to L databases to provide caller ID and oth popular services, Salemme said. The s ond test would require LECs to make it easy for users to switch local carriers as i to switch long-distance carriers.

But the pure resale option, whi AT&T once touted as its main strate may not attract many takers because t new carriers are apparently split on h big a wholesale discount the FCC shou require.

Competitors such as MFS Communi tions Company, Inc. and cable TV com nies that already have local networks wa a small discount to make things diffic for big, new local players that have done their own spadework, said T Tauke, Nynex Corp.'s executive vice pr dent for government affairs. In states t have already established wholesale counts, they range no higher than 1 (see Figure 2, page 31). ■

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Circle Reader Service #41

Ascom Timeplex helps users save big bucks

In-Site

By Tim Greene
Roanoke, Va.

Retired Person Services (RPS), a discount drug mail-order house, last year used its nine-site private network so inefficiently that some of its 39 T-1 lines were being used at just 3% to 5% capacity.

By merging its voice and data traffic onto the same T-1s and streamlining traffic patterns, the company believes it will save more than $1 million this year.

Those savings will pay back RPS' $1.2 million investment in the network of Ascom Timeplex, Inc. Synchrony products that the company credits with the savings.

In the beginning

When Don Resh started as chief information officer last year, the company had 39 T-1 lines feeding its eight regional pharmacies in a star topology. Each T carried voice or data but not both, an none of the lines had a backup line.

Voice traffic from incoming 800-nur ber calls to the regional centers went o over T-1s, but interoffice calls went ov conventional phone lines.

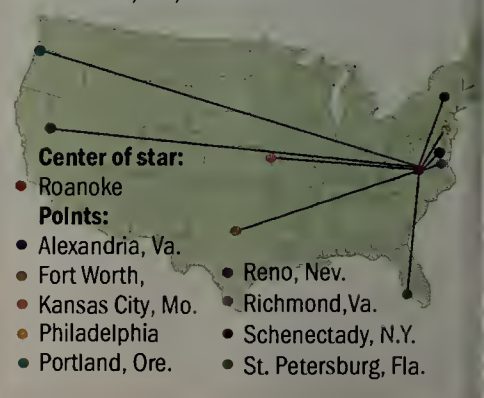
Network traffic was needlessly inflate because call center operators had to u the private network to tap Digital Equi ment Corp. VAX databases in the remo offices; there was no central database f customer information.

RPS also paid MCI Communicatio Corp. to handle calls that needed to l pulled back from regional offices ar transferred.

Using a Synchrony ST-1000 switch the RPS telecenter and smaller Synchro ST-20 switches in the regional offices, t company was able to transform the sep rate voice and data T-1s into hybr voice/data trunks. That improved ef ciency let RPS drop 19 T-1s and reap annual savings of $275,000, according Resh.

Net savings

Retired Persons Service will save more than $1 million using an Ascom Timeplex ST-1000 switch In Roanoke, Va., and ST-20s at remote sites.



Each T-1 is backed up with another from MCI, and RPS pays only when th are used. One glitch: During one test, t backup failed to come up, Resh said.

The Ascom Timeplex gear also allow Resh to switch voice traffic and drop t MCI callback-and-transfer service, fo savings of $400,000.

Intersite calls now go over the priv network, eliminating public netw phone calls between sites. Resh has not had the chance to figure out how mu that is saving.

Resh also has installed three Dig Alpha 8400 servers in the call center h so operators can tap user-informati databases locally. As result, load on regional VAX databases has dropp 75%, and they will be phased out a replaced by Microsoft Corp. NT servers

The Synchrony switches also let inc ing customer calls hold in the netw before an operator answers, rather th with MCI. With 10 million calls a year, t means a savings of another $440,0 Resh said.

Ascom Timeplex configured the g in its support facility before installing a switching it on Feb. 22. Since then, th has been just one problem: The wr V.34 chip in a router was creating two errors in large file transfers. Ascom Ti plex replaced the chip. ■

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NetShelter provides 73.5 vertical inches (42U) of industry-standard, 19-inch, rack-mount equipment as well as computer-grade ventilation to reduce heat build-up. There's no need to spend hours selecting from dozens of configurations. APC makes it easy, with a complete rack package right out of the box, requiring no cabinet assembly. The unit fits through standard office doors (unlike other racks... surprise!) and rolls into place on its integrated stabilizing feet and heavy duty casters. Back rails can be repositioned to various depths and cross members can be relocated for side-mounted equipment and convenient cable management.

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Access to the sides of the cabinet for equipment installation and service is provided in seconds by simply unlatching the locking side panels.

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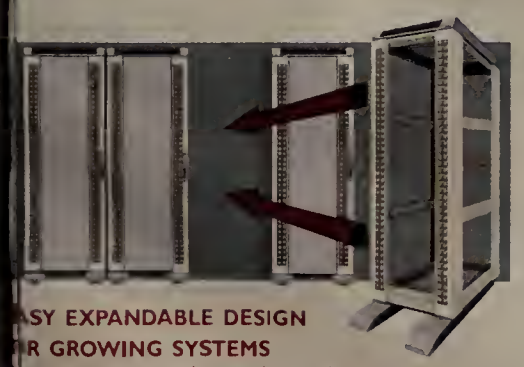
Choose APC NetShelter for easy installation of Compaq's Rack-Mountable ProLiant® Server line, external disk storage and accessories with our optional mounting kit, at a total price much less than comparable premium enclosures. NetShelter's fully ventilated design exceeds Compaq's requirements for third-party racks.



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When your system needs exceed one cabinet, you can easily create a bay of connected NetShelters in minutes! Unlike other enclosures, NetShelter expansion requires minimal time, tools and parts. Simply connect your first NetShelter to our expansion model that includes preinstalled baying hardware and use the side panels from your original.

UPS power management and diagnostic features increase uptime, reduce staff costs

PowerChute plus offers unattended system Shutdown, extensive UPS testing/status, Remote UPS management and Environmental/power monitoring so you can head off potential downtime. For SNMP-based WANs, APC's PowerNet provides comprehensive control from your network management console.

Share-UPS™ offers reliable shutdown for multiple servers even for different OSs

Provides a rack mountable solution for unattended safe shutdown of up to 8 servers (running the same or even different operating systems)-all from one UPS. Now you don't have to buy a separate UPS for each server in a mixed-OS environment.

Measure-UPS™ monitors NetShelter's environment even during power outages

APC's Measure-UPS prevents data or hardware damage by monitoring temperature, humidity, physical access and other external sensors. When alarm conditions occur, Measure-UPS along with APC software or hardware accessories can alert you and initiate a safe system shutdown. Moreover, network management nightmares like unauthorized access can be easily monitored with our Measure-UPS switch kit for NetShelter door openings.

ProtectNet™ data & network surge protection blocks "backdoor" surge damage, guaranteed to $50,000

Multi-port rack-mountable modules (PNET4) protect your Ethernet and token ring network from lightning and surge events. Also available in telephone (PTEL1-4). When used with an APC UPS to completely bulletproof your system, APC provides up to a $S0,000 repair/replace policy on protected equipment (see policy for details).

Smart-UPS RM rack-mount UPS provides performance power management for advanced networks

The ideal uninterruptible power supply (UPS) for rack mounted file servers, hubs, routers, telecommunications systems and other mission-critical equipment within NetShelter.

A few of Smart-UPS RM award winning features:

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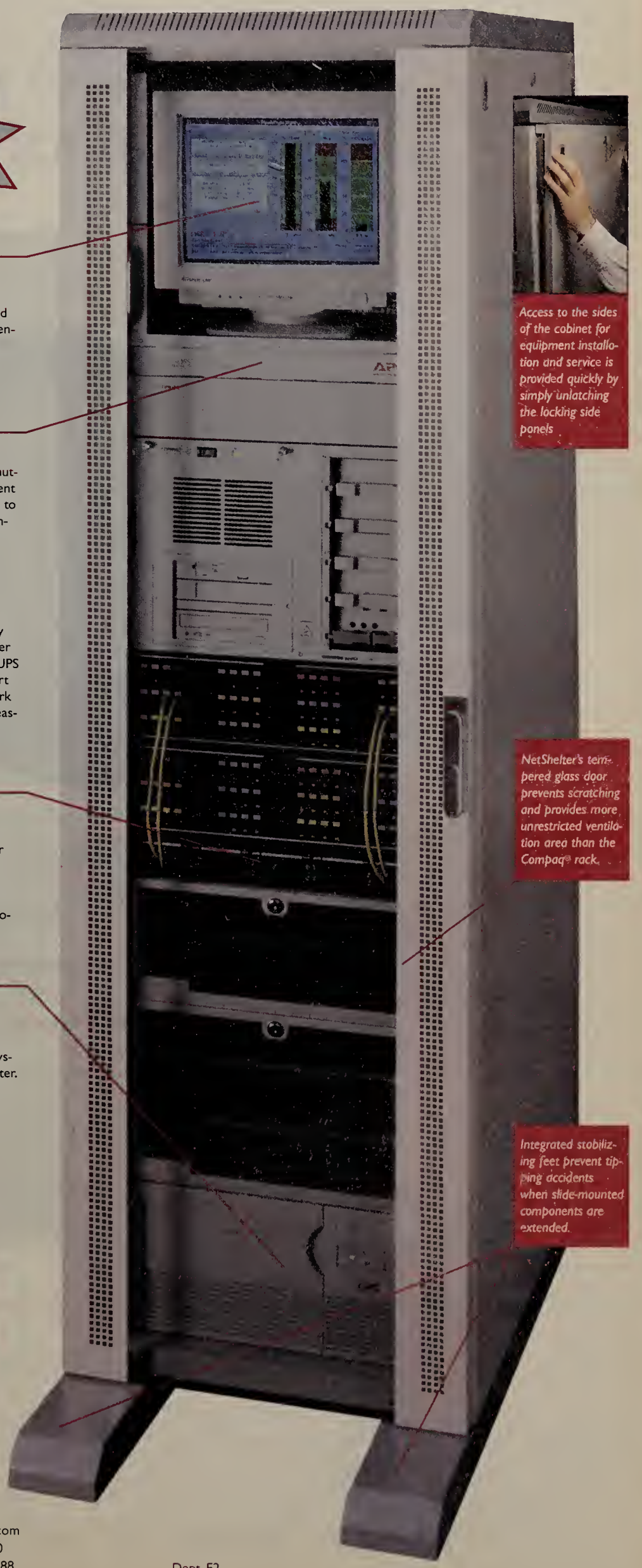
- QuickSwap™ allows safe and easy replacement of batteries while the system stays up
- 100% compatibility with Compaq® rack servers and Insight Manager



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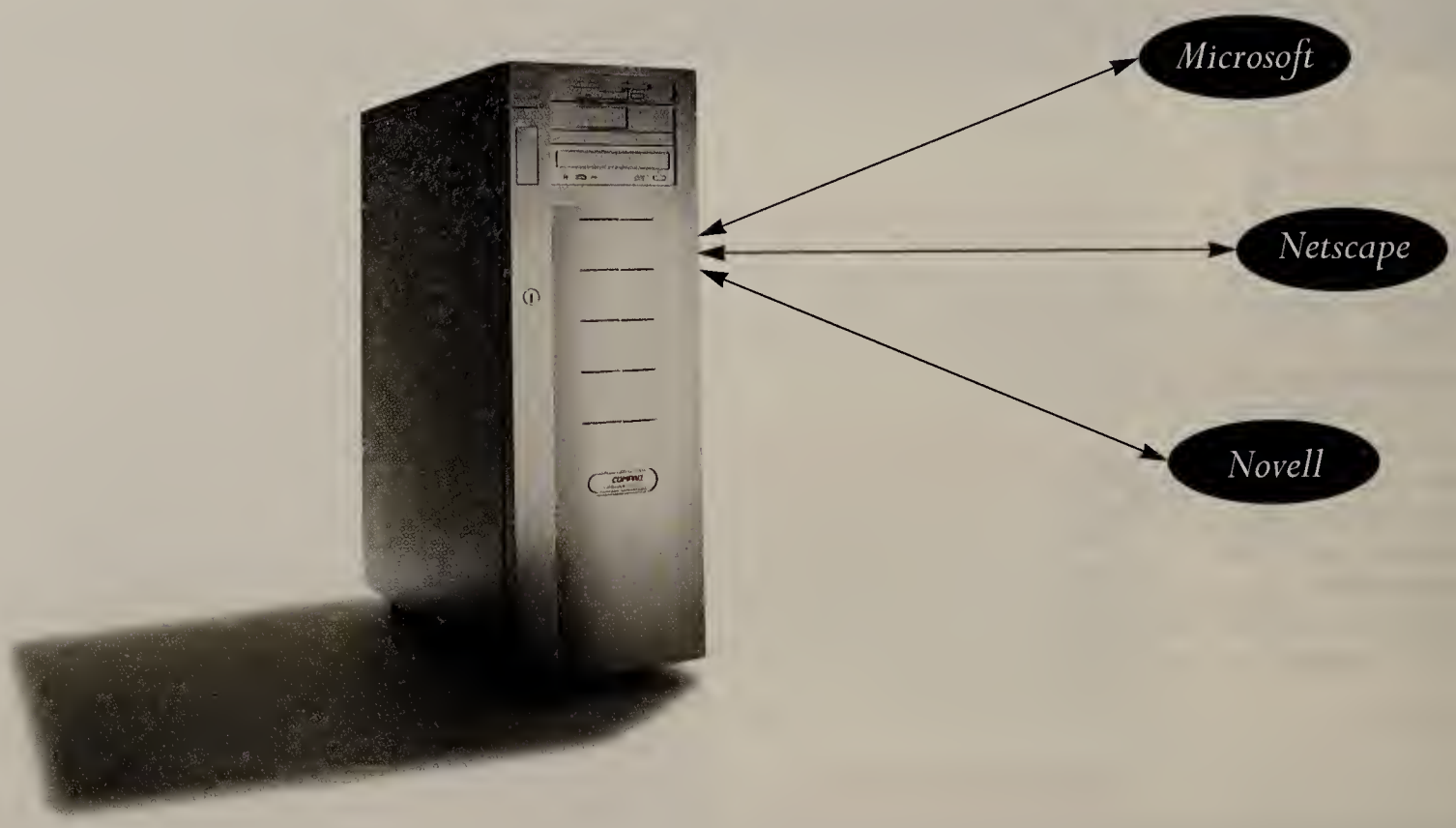

Last year the buzz about the Internet became a reality. Already the changes felt by business have been profound—from the way you can communicate with customers to the new markets it's creating. And now, thanks to Compaq, it's even easier to take advantage of it.

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Briefs

■ **Citadel Computer Systems, Inc.** *last week announced Phantom of the Console, a* **job-scheduling utility for NetWare servers.** *The product schedules the loading, unloading and execution of NetWare Loadable Modules, and executes any standard NetWare command or file. It also provides direct access to a server's DOS partition so administrators can manage files from a DOS prompt if they need to.*

The Phantom Alert Dispatch utility allows network managers to set parameters for activity on the server and identify steps the server should go through to remedy routing problems. It runs on NetWare 3.X and 4.X with DOS, Windows and Windows 95 clients. It costs $479 per server.

Citadel: (800) 962-0701.

■ **Command Software Systems, Inc.** *last week announced F-Prot Professional for NetWare, a* **virus-scanning NetWare Loadable Module.** *The product includes e.g. Software, Inc.'s AlertTrack system management application, which collects alerts from NetWare applications and presents them in a consistent format on a Windows workstation.*

A 25-user site license costs $995.

Command: (407) 575-3200.

■ *Wireless LAN vendor* **Proxim, Inc.,** *based in Mountain View, Calif., last week unveiled a new* **wireless bridge** *that allows customers to link Ethernet LANs in separate buildings when laying cable is not feasible.*

RangeLink Series 1500 is a 2.4-GHz radio frequency wireless bridge that can support as many as 15 separate 1.6M bit/sec net links without vying for the same radio frequencies. The device remotely bridges Ethernet LANs in buildings separated by up to three miles using frequency-hopping spread-spectrum technology.

Pricing for the RangeLink Series 1500 starts at $6,000 for a two-site solution. The product is available now.

Proxim: (415) 960-1630.

AIC imposes access to IP from NetWare

By Kevin Fogarty
Bedford, Mass.

American Internet Corp. (AIC) last week announced a low-cost gateway designed to help NetWare administrators better manage IP connections.

IP Access is a NetWare Loadable Module that gives IPX clients access to TCP/IP-based resources, including the Internet, through a NetWare server.

The product not only cuts down the administrative work of connecting NetWare clients to the Internet, it can also consolidate the number of IP addresses organizations need to maintain, according to Andy Sudduth, senior software engineer at AIC.

IP Access makes a single TCP/IP stack and IP address available for as many as 100 IPX workstations. That means administrators do not have to acquire and maintain a separate IP address for every workstation, Sudduth said.

See **AIC,** *page 38*

Plaintree rolls out new feature-rich switches

By Jodi Cohen
Waltham, Mass.

Plaintree Systems, Inc. broke its two-year silence last week by unveiling a new collection of Ethernet and Fast Ethernet workgroup, department and backbone switches.

Key distinguishing features shared by Plaintree's new store-and-forward or cut-through switching mode, are Plaintree's first new products since the company shipped its flagship WaveSwitch 100 workgroup switch in March 1994.

PLAINTREE MAKES WAVES

Product	Description	Pricing	Availability
WaveSwitch 4800	Eight-slot data center switch houses a mix of 100M bit/sec modules	Starts at $29,995	June
WaveSwitch 1216	16-port Ethernet departmental switch with two slots for high-speed uplinks	Starts at $5,995	Now
WaveSwitch 1018	16-port Ethernet workgroup switch with two fixed 100Base-T ports	Starts at $4,995	Now

The switches, all based on Plaintree's new Application Specific Integrated Circuit design, provide customers with high-speed switching, as well as sophisticated virtual LAN and management features.

The new WaveSwitch devices, which can operate in either a store-and-forward or cut-through switching mode, are Plaintree's first new products since the company shipped its flagship WaveSwitch 100 workgroup switch in March 1994.

The new WaveSwitch devices support port-, address- and protocol-based VLANs. The products also offer a Smart Virtual IP Subnet feature that allows IP subnets to span multiple switches, which reduces unnecessary broadcast and multicast traffic. Initial IP subnet membership can be learned automatically, reducing time-consuming configuration tasks.

In addition, Plaintree's Vrouter virtual routing module provides interVLAN communication between as many as 32 Vrouter ports, and supports IP and IPX protocols.

"It's nice to see a vendor that has actually taken the time to include some advanced functionality, like a variety of VLAN options and full RMON support, which really differentiates their switches," said Eric Hinden, program manager at The Yankee Group, a consultancy in Boston.

Product specifics

Plaintree's WaveSwitch 4800, the company's first backbone switch, is an eight-slot chassis that can support a mix of FDDI, 100Base-T and 100VG-AnyLAN FastLinx modules.

The switch boasts a forwarding rate of more than 1M packet/sec and can support as many as 4,096 media access control (MAC) addresses per port.

For departmental nets, Plaintree offers its WaveSwitch 1216 device, which provides 16 fixed Ethernet ports and two slots for FastLinx 100M bit/sec uplink modules. The switch operates at wire speed — 536,000 packet/sec — and supports as many as 4,096 MAC addresses.

The Model 1018 for workgroup nets is similar in design but has two fixed 100Base-T ports and supports 1,024 MAC addresses.

Pricing for the WaveSwitch 4800, which ships in June, starts at $29,995. The WaveSwitch 1216 and 1018 are priced at $5,995 and $4,995, respectively. Both are available now.

©Plaintree: (617) 290-5800.

Compex gives users freedom of E-net switching, repeating

By Jodi Cohen
Anaheim, Calif.

Small workgroup or branch office nets that need a performance boost but aren't quite ready for full-blown switching may get some relief from a new repeater/switch combo on the way from Compex, Inc.

The device, dubbed FreedomSwitch, is a 24-port 10Base-T repeater and a five-port segment switch all in one box. The product balances the amount of repeated traffic on the Ethernet segments using switching.

FreedomSwitch automatically assigns, via switching, any of the 24 shared Ethernet ports to any of four internal 10Base-T Ethernet segments based on current network traffic. The box also provides a 100M bit/sec uplink for a server or backbone connection.

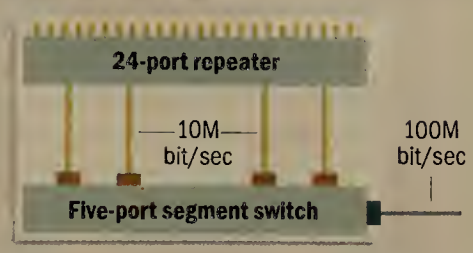
While Compex's box handles load balancing automatically, network managers can set the switch to rebalance at predefined time intervals or when certain thresholds have been reached. Also, some ports can be excluded from the rebalancing to lock out particular network segments for security reasons.

In addition, FreedomSwitch can be stacked up to six units high, but the load-balancing feature only works within one box. However, Compex plans to expand the balancing feature across a stack of switches.

The key to FreedomSwitch's load-balancing ability is the box's sophisticated management features, including support for all nine Ethernet Remote Monitoring groups. The load balancing also works in conjunction with Compex's FreedomView Lite net management software, a Simple Network Management Protocol-based application that allows net managers to graphically manage the switch by setting thresholds and alarms, viewing segment operation and

See **Compex,** *page 38*

SWITCH WITH A TWIST



Compex's FreedomSwitch houses a 24-port 10Base-T repeater and a five-port segment switch under one roof. The device automatically attaches, via switching, any of the 24 shared Ethernet ports to any of the four internal 10Base-T Ethernet segments for improved performance. The box also provides a 100M bit/sec uplink for a server or backbone connection.

NetFRAME bundles Notes with new servers

By Ben Heskett
Milpitas, Calif.

NetFRAME Systems, Inc. last week announced new servers optimized to run Lotus Development Corp.'s Notes groupware.

The new Notes MessageCluster 8570 and 8590 are designed for customers looking to consolidate Notes servers, providing simpler management. A fully configured 8590 server can support as many as 1,500 Notes clients.

The Notes MessageClusters are second in a line of groupware-specific servers from NetFRAME, which previously introduced servers for running Novell, Inc.'s GroupWise. The company this year will release server bundles for all major messaging environments, said Randy Meyer, director of marketing for NetFRAME.

NetFRAME's servers are optimal for large applications due to an internal failover capability that allows one processor to take over for a frontline processor if there is an interruption. They can be configured with two- and four-way Windows NT symmetrical multiprocessor engines.

The MessageClusters also feature separate application and I/O processors.

Analysts said superserver vendors such as NetFRAME need to do more than build a high-powered box these days to compete. "In order for NetFRAME to really do well in the market, they have to follow market trends, which are pointing toward packaged solutions," said Bob Sakakeeny, an analyst with the Boston-based consultancy Aberdeen Group, Inc.

Separately, Acer America Corp. last week introduced a new line of Pentium- and Pentium Pro-based servers featuring management hardware built into the server motherboard.

The low-end AcerAltos 900 is powered by a 133-MHz Pentium processor, supports up to about 75 end users, and can be used to run Web, file/print and other applications.

The next level up is the Model 9000, which can feature one or two 166-MHz Pentium processors and support up to 150 end users. The high-end 19000 is based on the 200-MHz Pentium Pro processor and can handle up to 250 end users.

✆NetFRAME: (408) 474-1000; Acer: (408) 432-6200.

Ready to serve

Company	Products	Features	Pricing	Availability
NetFRAME	Notes MessageCluster 8570 and 8590	Supports up to 12 processors, including 150-MHz Pentium chips for application processing and 486-based I/O processors; Windows NT 3.51; Lotus Notes 4.0; Maestro server management utility.	$90 per seat for a two-way SMP server supporting 1,000 end users	May
Acer America	AcerAltos 900, 9000 and 19000	Based on 133-MHz Pentium, 166-MHz Pentium and 200-MHz Pentium Pro processors, respectively; 4-6 PCI slots and 3 EISA slots.	$3,000 to $25,000	June (900 and 9000); July (19000)

NCD gives X terminals a WinNT spin

By Ellen Messmer
Mountain View, Calif.

Network Computing Devices, Inc. (NCD) last week announced WinCenter Pro 2.0, a Windows NT extension that lets multiple X-terminal users simultaneously access remote Window applications.

X terminals are inexpensive diskless workstations with virtually no memory. They are designed to access Unix-based applications running on far more costly, full-featured computers. WinCenter Pro 2.0 will extend the life of its Explora X-terminal line by allowing them to be used to run Windows applications over corporate networks, said Mike Harrigan, vice president of corporate marketing at NCD.

NCD's *Harrigan says WinCenter Pro will extend the life of Explora X terminals.*

To assemble WinCenter Pro, NCD has licensed NT Server code and combined it with Citrix Systems, Inc.'s WinFrame multiuser application server for running remote Windows applications on PCs.

NCD then added its own software code into the mix so dozens of X-terminal devices can simultaneously access a remote Windows application.

With the first version of WinCenter Pro out last November, users could only cut and paste text between workstation and Windows applications. With Version 2.0, users can cut and paste graphics, too. The new version also adds printer, sound and floppy disk support for X terminals.

"We've also added the capability of booting and configuring NCD X terminals from WinCenter," Harrigan said.

Pricing for WinCenter Pro 2.0 starts at $395 per seat in 15-user packs. It will ship in May.

✆NCD: (415) 694-0650.

AIC

Continued from page 37

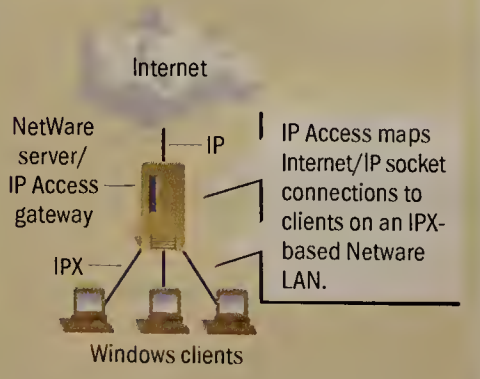
Jim Katoe, network analyst for O'Sullivan, Graev and Karabell LLP, a law firm in New York, said IP Access boosts network performance and File Transfer Protocol reliability. His company experienced a 30% increase in response times using IP Access, compared to when both IPX and TCP/IP stacks were running on clients.

Katoe also tested a similar product, CyberJunction from Frontier Technologies Corp. But he picked IP Access for his net — which has 130 Windows workstations — based on performance and price.

The AIC product running on a 486-based NetWare server outperformed CyberJunction on a Pentium machine running Windows NT Server, Katoe said.

Also, while both products had compatibility problems with the Lexis legal on-line service, AIC moved more rapidly to fix them, he said. And the $2,995 Frontier charges for a 10-user concurrent license is way beyond the $495 AIC charges for a 100-user version of IP Access, Katoe said.

IP ADDRESS CONSOLIDATION



The IP Access IP/IPX gateway lets organizations drastically cut the number of IP stacks and addresses they maintain by letting up to 100 workstations go through the same IP address.

IP Access includes server and client components. The server pieces include a TCP/IP stack and IPX name resolution engine, which maps IP sockets to IPX addresses. On the client side is a lightweight application that locates the nearest IP Access server by listening to Service Advertising Protocol broadcasts.

✆AIC: (617) 271-9200.

MORE ON-LINE

Read up on fast LAN technologies on Network World Fusion (http://www.nwfusion.com). Grab primers on:

- Fast Ethernet
- 100VG-AnyLAN
- FDDI

Network World Fusion

Select News+ then Local Networks.

Compex

Continued from page 37

running diagnostics.

Remote monitoring and control switch configuration can be done on port, segment or network basis through built-in serial interface.

FreedomSwitch is unique, said Esmirelda Silva, an analyst at International Data Corp., a market research firm in Framingham, Mass.

"This is really the only product of sort," she said. "It's an interesting approach that allows users to get some the performance advantages of switching for about half the cost of a true switch."

In addition to the repeater/switch device, Compex plans to offer a 10M/100M bit/sec switch later this year.

FreedomSwitch is priced at $1,999 and will be available by midyear.

✆Compex: (800) 279-8891.

WIRED WINDOWS

Beware the IATOLAH syndrome

At one time or another, we're all faced with a piece of software that exhibits what I call the IATOLAH — I Am The OnLy Application Here — syndrome.

You know the problem. Your software's installation program blithely overwrites files installed by other applications and rewrites your boot files or Windows files.

I've criticized Cheyenne Software, Inc.'s ArcServe for NetWare product in the past as being the single biggest culprit in crashing NetWare servers. The problem often is the result of a net administrator not taking the time to ensure the proper environment for the application when installing it.

Dave Kearns

But Cheyenne has done something that has made me change my opinion about the company and its products. I'm even prepared to hold Cheyenne up as an example to other software vendors looking to win support from software installers around the world.

Cheyenne's recently released Version 6.0 of ArcServe for NetWare includes what the company calls a Pre-Flight Check. This means that the installation program checks the following:

- Versions of common library files.
- Amount of RAM installed and its usage.
- Hardware and drivers installed.
- Version of Btrieve, the database that ArcServe uses, installed.

Wherever there's a possible problem, ArcServe will warn the person installing the software about it, suggest the changes needed and, in some cases, prompt the person to install updated libraries or drivers.

Not only does ArcServe do this when installing server-based NetWare Loadable Modules, but also when installing workstation-based agents for DOS, Windows, Macintosh and Unix machines.

One other nice touch in the product: When backing up data, ArcServe will automatically do a compare on the first 10 megabytes to be sure the tape is readable and can be restored. Too often, we only learn about a bad tape when attempting a restore, yet trying to validate a tape takes far too long given the small time window most of us have to complete a backup.

So a tip o' me hat to Cheyenne for delivering a well-behaved installation program. You can learn more about ArcServe 6 for NetWare at http://www.cheyenne.com/Product-Info/WhitePapersARCserve6-complete.html.

I'm sure there are other "nice guy" installation programs, which prove that the developer has taken extra time to ensure that the application being installed will cooperate with others already present. If you know of any that are exemplary in this regard, message me with information about them and we'll build a list.

With so many applications competing for your dollar — many of which have similar functionality — one that promises to do something extra during the installation process might have the edge on its competition.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

Tip of the week

A new electronic mail-based newsletter has been launched that promises to provide news on software patches, new hardware and software products, promotions offered by various vendors and upcoming conferences. It's free and will be available shortly. Subscribe by sending E-mail to netnotify-request@ki.net with the word "subscribe" (without quotation marks) as the body of the message.

NET RESULTS

Cisco/StrataCom deal puts pressure on rivals

Skip MacAskill and Melinda Le Baron

Keeping pace with Cisco Systems, Inc. got much harder last week for its rivals.

As if it isn't already tough enough to compete with the company's arsenal of LAN switches, routers and remote access gear, Cisco last week entered into a $4 billion agreement to acquire frame relay and ATM WAN switch maker StrataCom, Inc. While Cisco has been far more than a LAN vendor from the start, the StrataCom deal clearly makes Cisco much stronger than it has ever been in the WAN market.

The deal will enable Cisco to meet customers' network needs at the workgroup, campus, backbone and remote-office levels. It also boosts the company's presence in lucrative carrier and Internet service provider network environments.

But this acquisition does something less obvious for Cisco: It eliminates relationships between StrataCom and Cisco competitors Bay Networks, Inc. and 3Com Corp.

In the past, StrataCom had done joint development with Bay and had participated in joint marketing and sales with Bay on an account-by-account basis, when customers wanted ATM LAN and WAN attachments. This relationship will be quietly dissolved as StrataCom finalizes obligations with current shared customers.

The relationship with 3Com was not widely known. According to StrataCom, it had not even gotten off the ground. The two firms were planning a public interoperability demo of their respective products during the coming months, but this is obviously not going to happen.

So who does a LAN or internetworking vendor partner with for WAN switching in the wake of the Cisco/StrataCom deal?

Fore Systems, Inc. has already partnered with Northern Telecom, Inc., while IBM recently sealed a relationship with Cascade Communications Corp., a major StrataCom rival.

But what about 3Com, Bay and Cabletron Systems, Inc.? They might consider snapping up Cascade, but the price would likely be very high. And IBM writes ironclad contracts, so that could be an obstacle for anyone looking to buy Cascade. Then again, 3Com didn't let such a tight relationship between IBM and Chipcom Corp. stop it from buying Chipcom.

Unlike new areas of technology, wide-area switching is an established market where the standards and specifications are detailed and lengthy. Homologation and certification within the U.S. and abroad is painful and time-consuming – sometimes taking as long as 24 months before equipment can be shipped to foreign countries and physically attached to phone company-provided lines.

It would be extremely difficult for a vendor to buy a small company in this area and leverage that into a full line of credible products, and even more of a challenge to hire the expertise to develop products themselves. An exercise like this could easily take 36 months.

Cisco, on the other hand, has only to wait until the acquisition is final, which is targeted for the end of June. The company has gained a high-profile WAN provider and has managed to give at least two of its competitors some important new challenges for the future. We expect that Cisco CEO John Chambers is smiling right now.

Le Baron is a research director and MacAskill a senior research analyst in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached by E-mail at inquiry@gartner.com or by phone at (26 316-1111.

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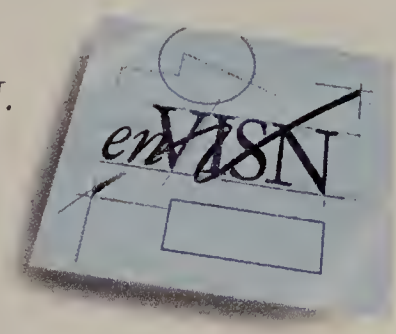

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And virtual networking that lets you reconfigure on the fly is part of enVISN, too.

It's enterprise-wide, and LAN-focused. It embraces Ethernet, Fast Ethernet, Token Ring, FDDI and ATM. And best of all, unlike would-be competitors, enVISN is ready right now. As opposed to "real soon now."

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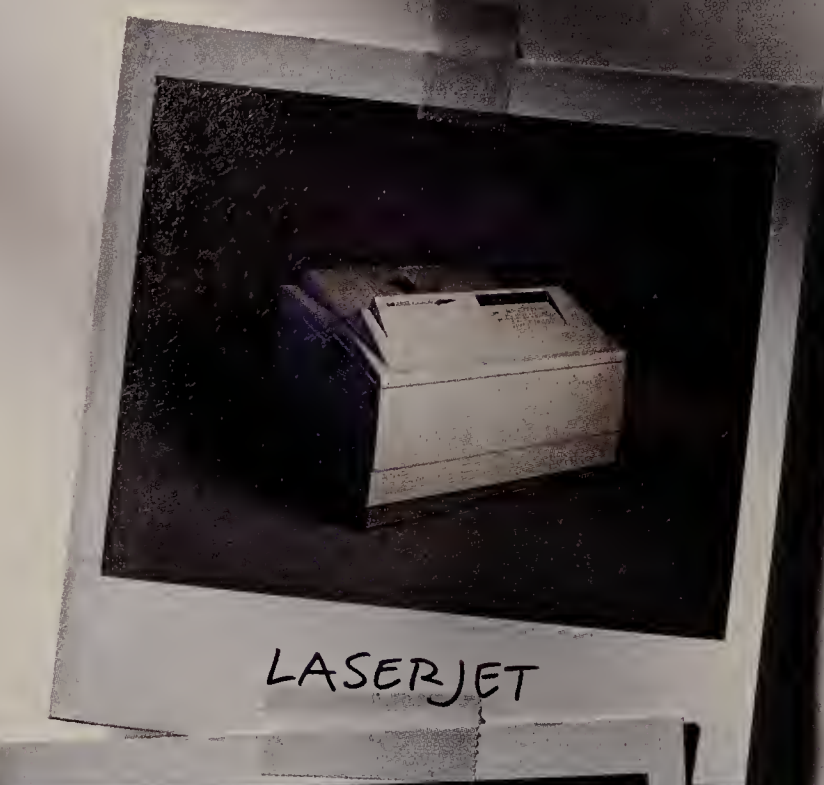

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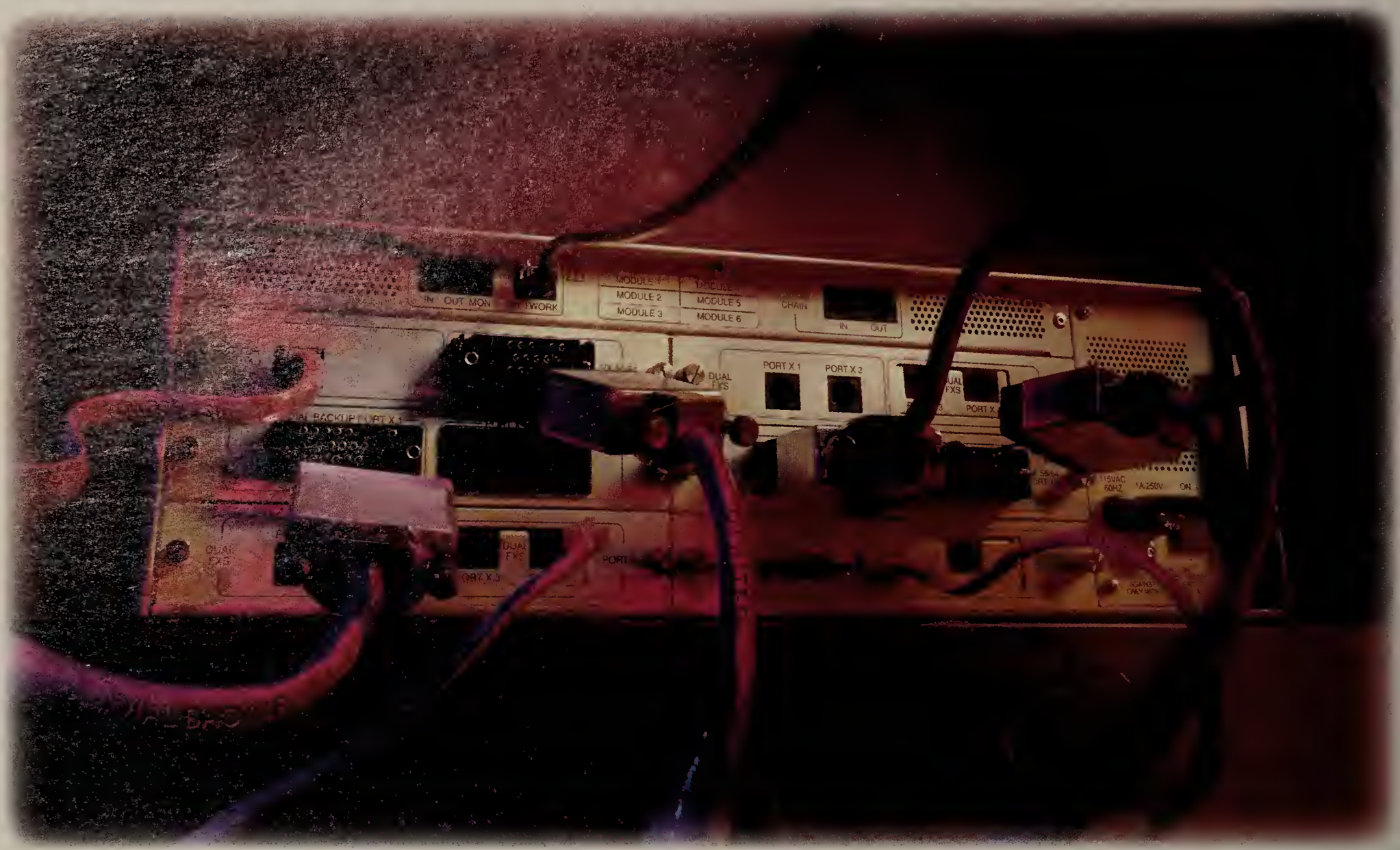

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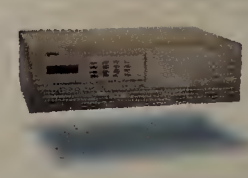

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Briefs

■ **Hewlett-Packard Co.** *has unveiled HP ORB Plus 2.0, an* **object request broker** *that meets the specifications for Version 2.0 of the Common ORB Architecture. The new release boasts improved performance, enabling developers to select only those CORBA 2.0 services — such as events, naming and life cycle management —that are needed in a given application.*

Available now, list prices are $3,000 per developer. Run-time licenses range from $50 to $200 per computer, depending on quantity.

HP: (800) 637-7740, Ext. 1587.

■ **Trilogy Technology International** *of City of Industry, Calif., has released the OpenPath Remote Data Access/Open Database Connectivity (RDA/ODBC) driver, aimed at C/C++ application developers. The driver uses Trilogy-developed technology to create very fast access to target databases. The driver also will work with any* **ODBC-compliant database,** *eliminating the need to buy and use separate drivers for each client application.*

The software costs $895 for a three-user license and about $15,000 for an unlimited site license.

Trilogy: (818) 854-6288.

■ **Management Science Associates, Inc. (MSA)** *in Pittsburgh has released BusinessWeb 2.0, a tool set for building* **data analysis programs** *that can be activated from a Web browser. The tool set and its utilities can access data directly in the Essbase online analytical processing (OLAP) database from Arbor Software, Inc. and the Cross-Target database from Dimensional Insight, Inc. Interfaces to other OLAP products are being built along with an interface to the OLAP Council's Open API.*

Pricing for a HyperText Transfer Protocol server, development software, and installation and training is $30,000 per server. There is a $295 annual license fee per client workstation.

MSA: (412) 362-2000.

HP opens up E-mail system to the Internet

By Barb Cole
Anaheim, Calif.

Hewlett-Packard Co. this week will announce a new set of services for letting users of its OpenMail electronic mail system leverage the Internet.

HP's Internet Collaboration Services will make OpenMail's messaging, calendaring, and scheduling, conferencing, shared folders and security services accessible via World-Wide Web browsers.

The company will make the announcement at the Electronic Messaging Association '96 conference and exposition here, where several E-mail makers are expected to talk up their 'Net plans (see story, this page).

The HP announcements will build on the company's support for the Simple Mail Transfer Protocol, a transport for sending E-mail via TCP/IP nets, and Multi-purpose Internet Mail Extensions, which lets users send attachments along with mail messages.

HP will roll out its extended Internet support in several phases.

First, end users will be able to take advantage of the shared-folder capabilities of OpenMail servers via a standard Post Office Protocol 3 (POP3) client by August, according to Raul Mujica, an HP product marketing manager.

Also around August, OpenMail will gain support for the Lightweight Directory Access Protocol, an X.500-like directory service technology that is emerging as a standard for Internet-based messaging.

Around that same time, the company will ship a new OpenMail Web client that will be accessible from Netscape Communications Corp.'s Navigator and other Web browsers by connecting to a Web server or home page and entering a password.

Several additional 'Net capabilities are expected by November, including the ability to access OpenMail calendaring features via browsers and support for Internet Message Access Protocol 4, a sort of second-generation POP3 with extended support for remote workers.

In addition, HP plans a

See **HP,** *page 48*

HP's Internet focus

OpenMail feature	Availability
LDAP support	August
Shared folders	August
POP3 support	August
Web client	August
IMAP4 support	November
Threaded conversations	November
Web-based calendaring interface	November
Web publishing	November

Internet wares debut at EMA

Products that bridge electronic mail systems and the Internet are expected to take center stage at the Electronic Messaging Association '96 conference and exposition in Anaheim, Calif., this week.

Here's what to expect:

■ Baranof Software, Inc. will announce Web Enabler for MailCheck, software that allows administrators to manage E-mail systems via World-Wide Web browsers.

The software publishes messaging management data in HTML format and eliminates the need to be at a MailCheck console in order to manage the mail network. Web Enabler for MailCheck, priced at $495, will ship next month.

■ Deming Software, Inc. will demonstrate Secure Messenger, its Microsoft Corp. Exchange add-on that adds encryption and digital identification technology to messages.

EMA 96

With Secure Messenger, mail messages can be read only by the designated recipient. The software uses Digital IDs by VeriSign, Inc. to authenticate senders. Secure Messenger will ship next month. Pricing was not available.

■ Lotus Development Corp. will announce enhancements to its business partner program. Lotus will launch four campaigns around Notes Release 4, Lotus components, client/server messaging and the Internet, according to company officials. The aim is to get prerelease code to partners and encourage them to build components for Notes, company officials said.

■ Ibex Technologies, Inc. will roll out Email-On-Demand, an E-mail system that lets users request information and receive it via E-mail or fax.

The Windows NT application may receive messages from Microsoft's Messaging Application Programming Interface or Simple Mail Transfer Protocol-based mail systems. Available now, pricing starts at $2,500.

Baranof: (617) 926-6626; Deming: (206) 882-8861; Lotus (617) 577-8500; Ibex: (800) 975-4239.

— Barb Cole

New object broker links Java and server applications

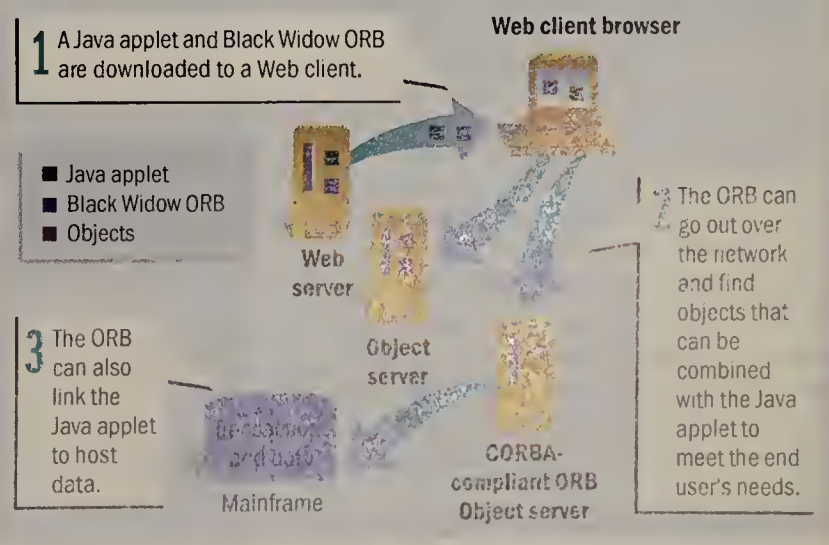
By John Cox
Mountain View, Calif.

Beta-testers are giving good grades to a new object communications product that lets them connect World-Wide Web browser-based Java applications to other applications on servers and hosts.

request broker (ORB) such as PostModern Computing, Inc.'s Black Widow comes into play. An ORB is software that fields requests from objects, finds the remote objects that can satisfy the requests and connects them.

Black Widow, which is written in Java, links Java objects over the

POSTMODERN CREEPS INTO JAVA MARKET WITH BLACK WIDOW



That connection is critical if Java is to be more than just a technology for building small applets that can be downloaded to and run inside a Web browser. Right now, because these applets cannot talk with applications on other servers, their usefulness is limited.

That is where an object

network using the Internet Inter-ORB Protocol (IIOP) specified in the Common ORB Architecture. Just as importantly, the use of IIOP lets Black Widow connect Java objects to non-Java objects that are controlled by other ORBs that conform to CORBA. Through this CORBA

See **Black Widow,** *page 48*

XDB tools protect Web-enabled databases

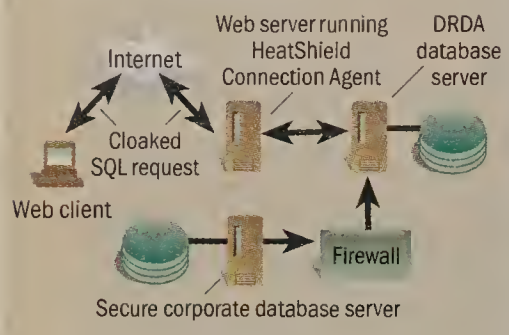
Software package HeatShield includes middleware as well as development and migration tools.

By Barb Cole
Columbia, Md.

XDB Systems, Inc. last week announced software for linking corporate databases to the Internet, giving companies a way to create Web pages that are interactive yet secure.

The client/server software, dubbed HeatShield, can be used to provide World-Wide Web access to any Open Database Connectivity (ODBC)-compliant or Distributed Relational Database Architecture (DRDA) database. It also can boost the performance and security of Web-enabled DRDA databases, such as IBM's DB2/MVS or XDB's own PC-based implementation of DB2.

PUT UP YOUR HEATSHIELD



XDB's HeatShield Connection Agent cloaks incoming SQL requests to conceal the structure of corporate databases. The HeatShield server passes requests on to the appropriate DRDA database. XDB also provides HeatShield tools for migrating nonsecure corporate data onto the DRDA and ODBC databases for public consumption.

HeatShield includes server-based middleware, a database, migration tools and a collection of client-based tools for developing HTML documents.

The software is designed to work with a Web server, but it is not required to run on the same machine.

HeatShield acts as a buffer between Web applications and databases, channeling SQL requests to the appropriate database and applying additional security features. With DRDA databases, the software uses an SQL cloaking feature that hides the structure of the corporate database when sending SQL commands across the Internet.

In addition, HeatShield implements security at the application level, rather than at the table or user level. As a result, there is no need to grant, maintain and monitor individual and group privileges. Everyone who uses the application has the same privileges.

"ODBC applications typically require developers to grant privileges on tables. But in the Internet world, you may not know who your users are," said Kim Ball, vice president of technology at XDB.

The HTML editing tools included with HeatShield let developers link Web pages to databases without using programming languages like C or PERL.

The software also comes with XDB's relational database, but users are not required to store data in it.

Although the market is flooded with software to link databases to the Web, analysts said HeatShield is unique because of its strong links to legacy databases.

"The fact that HeatShield can easily ti into the mainframe world is key," sai Judith Hurwitz, president of Hurwitz Con sulting, Inc. in Watertown, Mass. "Ther is still so much data out there in DB2," sh said.

HeatShield runs on OS/2, Windows and NetWare servers, and will ship in November. Pricing is $5,995 to $39,995 depending on the number of servers.

✆XDB: (410) 312-9300.

COMMENTS?

See "How to reach us" on page 8.

BEA unveils new Tuxedo plans

y John Cox
unnyvale, Calif.

EA Systems, Inc. has unveiled plans to rn the Tuxedo transaction processing TP) monitor into a linchpin for distrib-ed, line-of-business applications.

The company will rebuild Tuxedo's core so the TP monitor can be used to coordinate requests for services from object-oriented applications across an enterprise network.

In a related move, BEA this summer will announce details of a new Internet commerce server, which is being designed to support high-volume Internet/Web transactions and connections to legacy data. BEA's Tuxedo-based commerce server, due to ship this fall, will let Web browsers accessing Tuxedo services via the Web kick off secure distributed transactions.

Earlier this year, BEA acquired from Novell, Inc. rights to develop and sell Tuxedo on all platforms except NetWare, which Novell will continue to handle. The BEA offering is now called BEA Tuxedo.

The next major Tuxedo release is due this fall, according to William Coleman, BEA's president and chief executive officer. This release and later versions are intended to create a complete framework for distributed applications.

To this end, BEA is rebuilding Tuxedo's core with object-oriented technology. The plan is to create a service layer to which new services, such as encryption, can be easily added. On top of this layer will run various "personalities," or sets of interrelated application functions, such as the BEA Tuxedo transaction system.

Company: BEA Systems
Founded: January 1995
Mission: To provide software for building, deploying and managing distributed, line-of-business applications
Key offerings: Tuxedo, a portable transaction processing management system; related utilities and development tools; support, consulting and systems integration services
Management: William Coleman, chairman and CEO; Edward Scott, executive vice president, worldwide field operations; Alfred Chuang, executive vice president and chief technology officer
No. of employees: More than 200
'95 revenues: $35 million

In the future, BEA will release personalities for IBM's System Object Model, Sun Microsystems, Inc.'s Java and, eventually, Microsoft Corp.'s Distributed Component Object Model. As a result, application developers using these object models will be able to build object applications that can call Tuxedo's distributed services directly. Eventually, BEA will incorporate true object request brokers with Tuxedo, Coleman said.

✆BEA: (408) 743-4000.

BusinessBriefs

Two Internet mail companies announced plans to merge last week. **Software.com, Inc.** and **Accordance Corp.** will join and do business as Software.com. Both firms sell Internet mail servers, though Software.com is positioned at the departmental market and Accordance's offering is aimed at the high end. The companies' products will continue to be sold individually but will also be offered as a pair. Terms of the deal were not disclosed by the privately held firms.

Computer Associates International, Inc. has agreed to embed **Spyglass, Inc.'s** World-Wide Web server technology into its OpenIngres/Internet Commerce Enabled database, providing customers with unified access to HTML-based and relational data. CA turned to Naperville, Ill.-based Spyglass because the company's Web software can run on multiple platforms and boasts high-speed performance, said Yogesh Gupta, senior vice president for CA product strategy.

Black Widow

Continued from page 45

connection. developers can connect new Java applets to existing C or C++ programs. With the addition of an object wrapper, this connection also links Java applets to mainframe transactions and data.

Black Widow also lets client applications written in Java, C++ or SmallTalk access server programs written in Java, said Henry Balen, technical director with Fusion Systems Group, a New York consulting firm specializing in distributed object technologies and a Black Widow test site.

Fusion Systems recently demonstrated Java client applications working with server-based C++ applications via Black Widow and Expersoft, Inc.'s ORB.

A major U.S. bank is also testing Black Widow, evaluating the ORB as part of a strategic move toward object technology and the Internet. The bank is creating a set of CORBA-based business objects representing services, such as loans, according to the bank's chief object architect, who requested anonymity.

"We want to move these business functions to customers through different delivery channels, such as the Internet," he said. "Using Black Widow is a natural way to do this."

"It's great technology," he added. "Today, you find very few real applications on the Internet; it's just static information. With Black Widow, I'm talking about on-line, real applications."

Balen said Black Widow worked as expected and was fairly easy for experienced programmers to use. Performance was acceptable, at least for the small prototype applications his team built. Using Black Widow to interconnect Java applications is "very straightforward," he said.

Both Balen and the bank's object expert agreed it is unclear how well Black Widow, or any distributed object environment, will handle lots of users and high traffic volumes. Also, there are few tools for managing distributed object environments. All these deficiencies will have to be overcome to deploy large-scale distributed object applications.

Black Widow is available now on Windows NT, Windows 95 and Solaris operating systems. It is priced at $99 per CPU.

©PostModern: (415) 967-6169.

HP

Continued from page 45

November rollout of support for threaded conversations over the Internet and the ability to publish information from OpenMail to Web pages.

Down the road, users will also be able to leverage HP's Web security technology when sending messages between OpenMail and the 'Net, according to Mujica.

Analysts said the move is key because HP rivals Microsoft Corp. and Lotus Development Corp. have already announced similar plans. "It's a no-brainer to say that you want your electronic mail system to support [a broad range of] Internet standards," said Bruce Robertson, an analyst at META Group Inc. in Reston, Va.

Tim Sloane, an analyst at Aberdeen Group, Inc., a research firm in Boston, said HP "is hitting on all the right Internet standards."

OpenMail users were also enthusiastic.

"We're very interested to see tighter integration between Netscape Navigator and OpenMail," said Jim Runde, director of technical services at Furman University in Greenville, S.C. "Students can currently use the mail features in Netscape and send messages using fake names in our OpenMail system."

The additional OpenMail 'Net hooks will add security checking that the university cannot currently do within Navigator, he said.

©HP: (800) 637-7740.

Read up on IMAP4—client/server messaging for the Internet — on Network World Fusion (http://www.nwfusion.com). Select News+ then Client/Server Applications.

Network World Fusion

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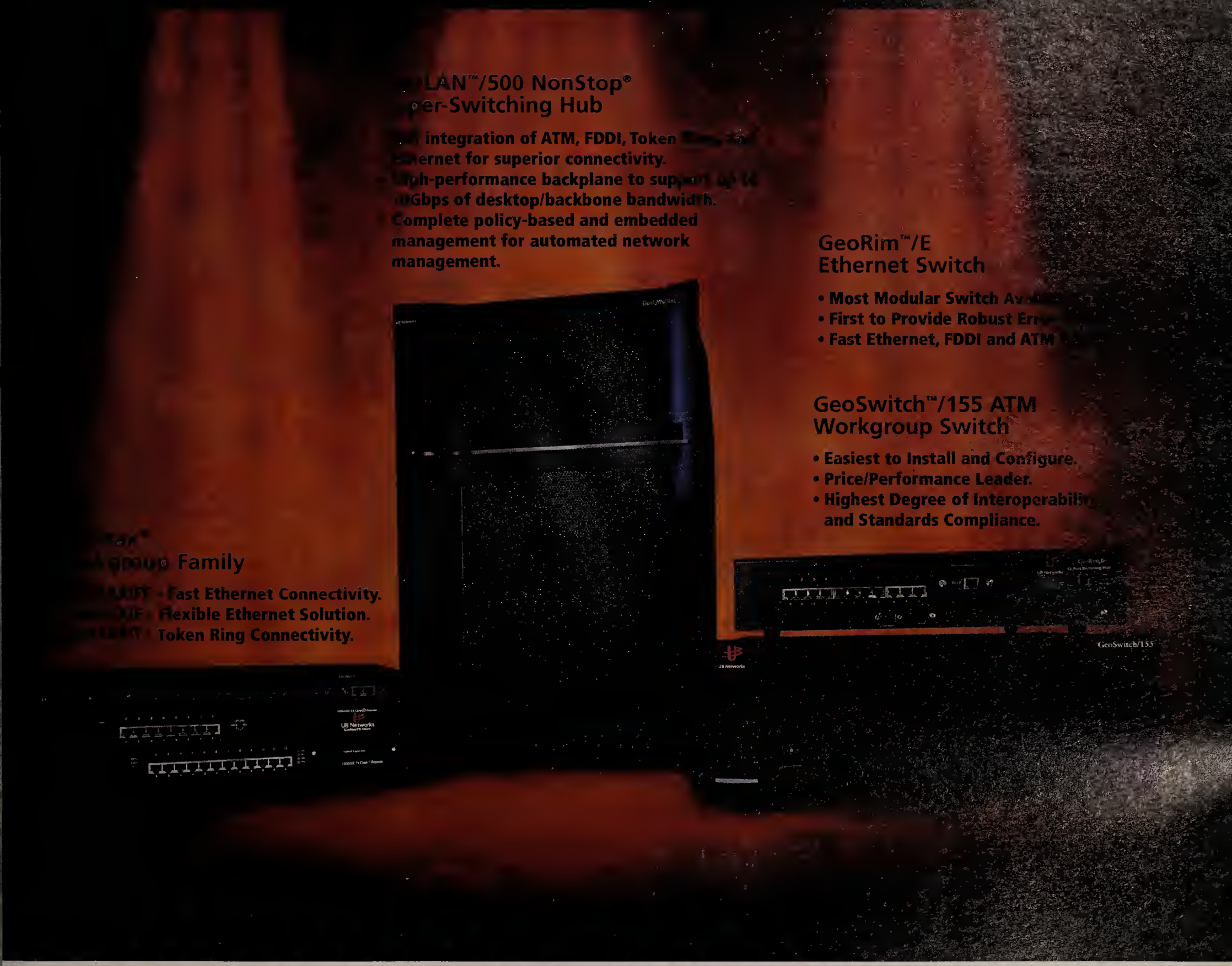

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IMAP gets on the messaging map

Most LAN messaging clients are proprietary: If you have a client from one vendor, you must use a server from that same company. This limits customer choice and creates tremendous migration problems.

While growing adoption of Microsoft Corp.'s Messaging Application Programming Interface has improved matters, MAPI is an API rather than a protocol. To mix multivendor MAPI clients and servers, you still need a proprietary piece of software on the client that links to the vendor's server.

Open client/server access protocols such as the Internet mail Post Office Protocol 3 (POP3) make a big difference. Once, extremely frustrated with unsatisfactory service, I changed from one Internet mail provider to another. Because my client software used POP3 and both service providers supported POP3, I continued with the same software and the same mailbox without a hitch.

However, POP3 implementations usually offer limited functionality and are suited only for end users accessing a single machine.

Then there is the Internet Message Access Protocol 4 (IMAP4).

IMAP4 gives the end user a choice of accessing and manipulating remote mailboxes as if they were local or downloading messages to the client. So if you're going to play musical computers between your laptop and desktop, your IMAP4 mailbox can live on the server. Or if you're setting off on a long trip and will only occasionally log on, your mailbox can live on the laptop.

Daniel Blum

Even better, the IMAP4 protocol can support juicy features such as selective message downloading, shared folders and access to multiple mailboxes.

But for some time, IMAP4 has been stuck in limbo, between inexpensive, popular POP3 offerings and slick, proprietary messaging and groupware packages.

That's changing, however, as the IMAP4 request for comment picks up support from major vendors.

For example, the recently released Sun Microsystems, Inc. Solstice mail server supports the protocol. And Hewlett-Packard Co. has announced that it will support IMAP4 on its OpenMail server. Other vendors, such as Isis Corp. and Isocor, are already shipping IMAP4 servers.

Of course, there are still many holdouts. None of the Big Three LAN E-mail vendors — Lotus Development Corp., Microsoft and Novell, Inc. — has adapted their message stores and discussion databases to support IMAP4. Netscape Communications Corp. doesn't support IMAP4, either.

But as the bard sang, the times they are a-changin'. Making the rounds of corporate offices in several countries, I am struck by customers' changing perception of the messaging server's role. Customers now expect the backbone to support high-performance client/server mailbox access and basic groupware features through a choice of E-mail clients based on open industry standards.

It will be tough for budding IMAP4 vendors to take on the dominant vendor. As I once warned one of my clients who happened to be an IMAP4 vendor, "You're going to feel like Hercules attacking the many-headed Hydra monster, where each head is an integrated groupware feature that you can't access without their software."

But as big customers begin to see the relationship between their general requirements and IMAP4 support, everyone will get the message.

Blum is a principal at Rapport Communication, a consultancy that focuses on messaging, groupware and electronic commerce. He can be reached at dblum@interramp.com.

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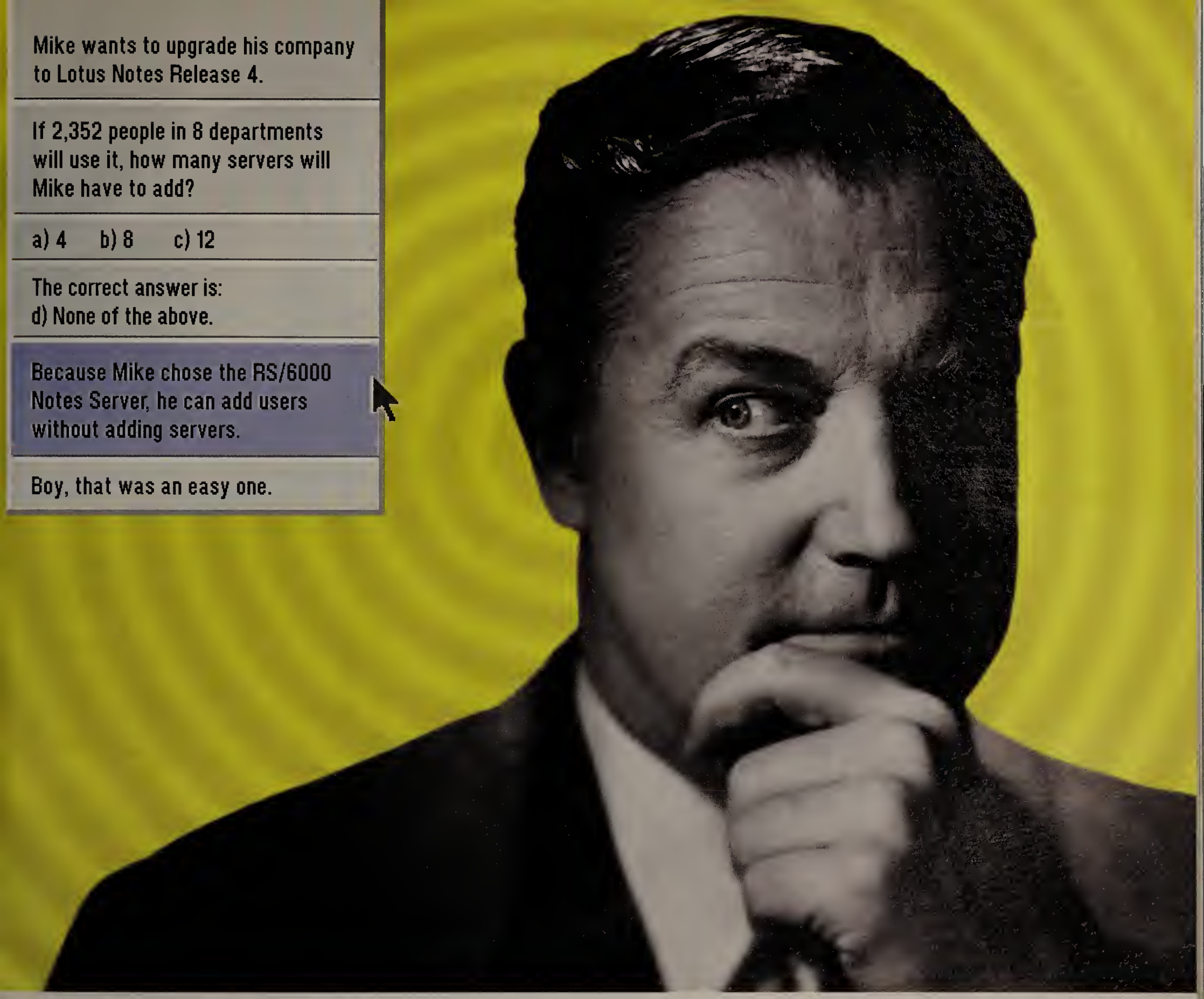

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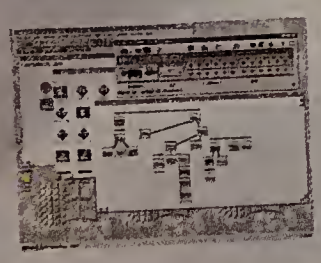

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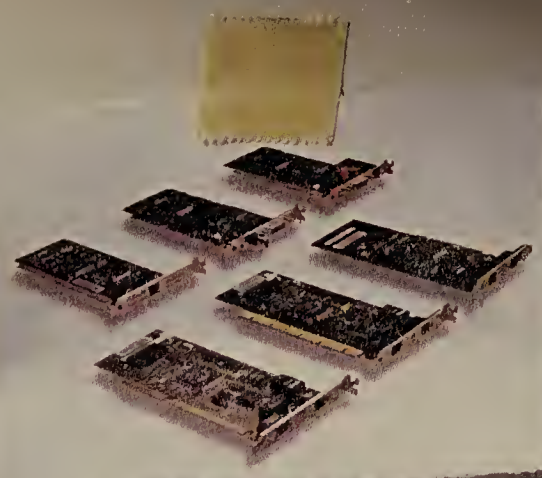

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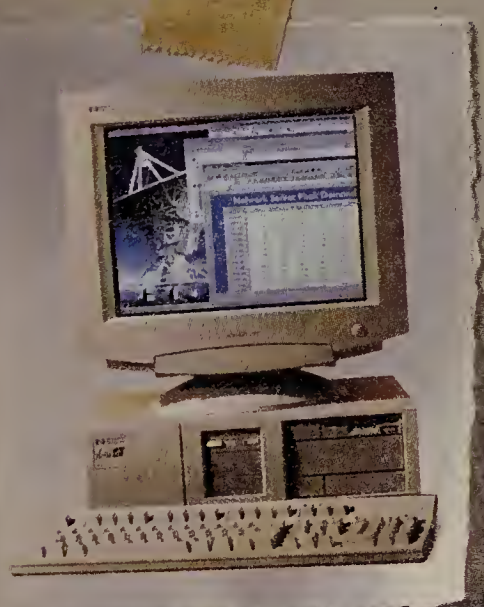

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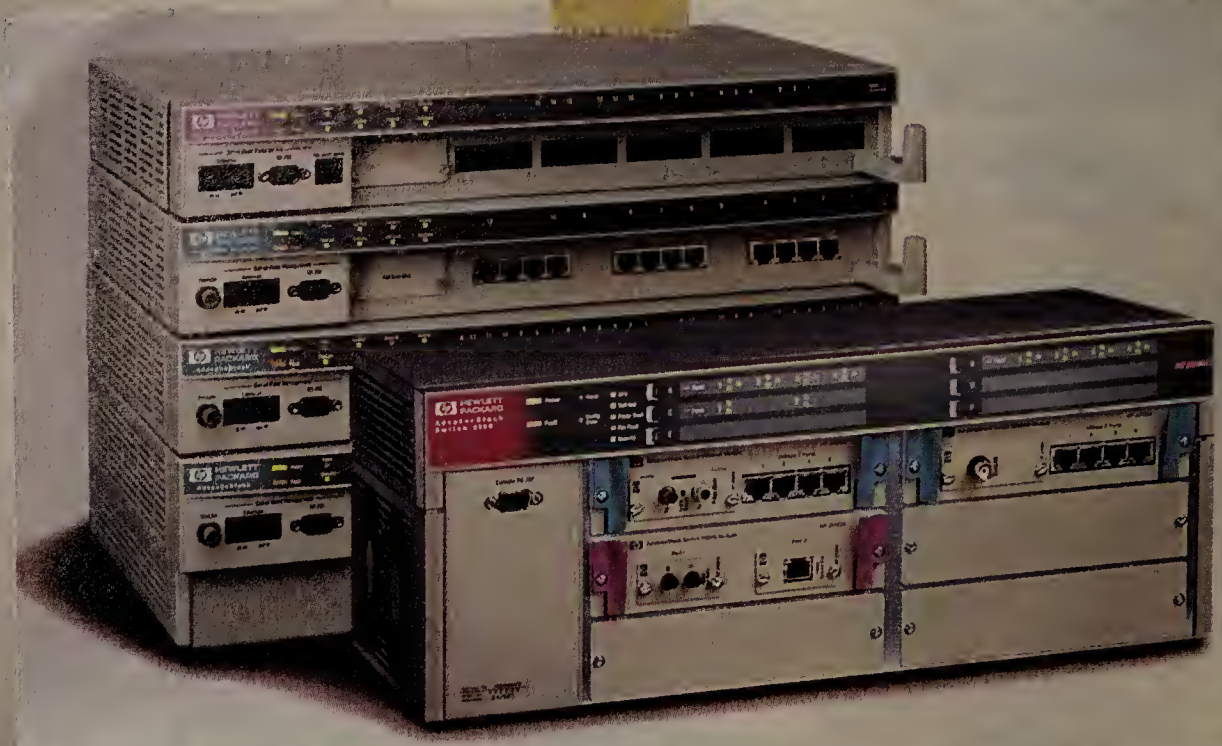

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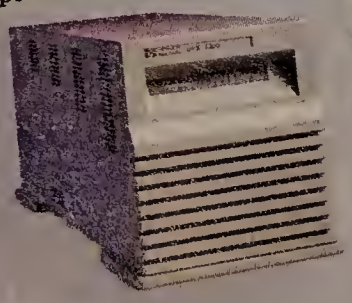

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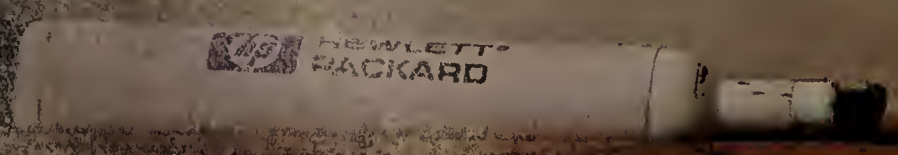

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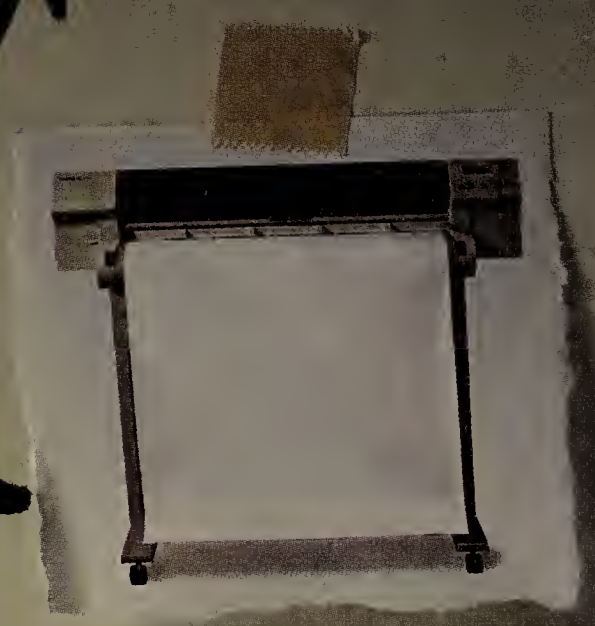

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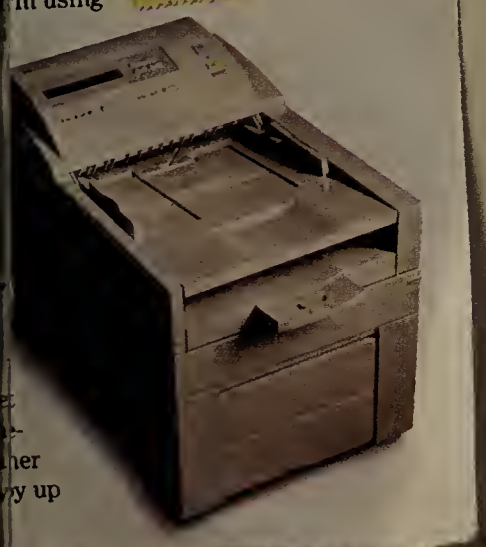

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Covering: Internet Technologies and Services for Collaboration and Electronic Commerce

Briefs

Koop

■ *Former U.S. Surgeon General* **C. Everett Koop** *will make on-line presentations and moderate forums as part of IBM's planned* **HealthVillage** *World-Wide Web site for health information.*

■ **Process Software Corp.** *this week will introduce Purveyor IntraServer for Windows NT. This combo package of Web server and management tools has templates for setting up corporate divisions, such as human resources, to create an enterprise intranet for* **converting application files into HTML** *format. Prices start at $1,095.*

Process Software: (508) 879-6994.

■ **Integrix, Inc.** *and* **Teledyne Electronic Technologies** *are teaming to produce* **security software** *that will run on scalable processor architecture (SPARC)-compatible servers to set up encrypted point-to-point communications on corporate LANs and WANs.*

Integrix: (800) 300-8288.

■ **Campbell Services, Inc.** *last week began shipping OnTime Web Edition, a $950* **scheduling** *server application for Windows NT that lets Web browsers access calendar information over the Internet. An upgrade, planned for midyear, will let users update their calendar across the Web, as well.*

Campbell: (810) 559-5955.

■ *Lisle, Ill.-based* **Mercater, Inc.,** *which makes the SoftCart software that merchants use for Internet electronic storefronts, has* **changed its corporate name** *to Mercantec and has a new Web address at www.mercantec.com.*

■ **MCI Communications Corp.** *has begun providing an electronic data interchange service called* **RapidEDI** *that lets financial institutions convert their Automated Clearinghouse messages into EDI format for delivery to trading partners.*

Flood of new products due at Internet World

By Carol Sliwa
San Jose, Calif.

This week's Internet World show here should be a hotbed of activity, with scores of new or upgraded products making their debut.

Here's a small sampling:

■ WebFlow Corp. of Santa Clara, Calif., will launch a server-driven workgroup application delivered entirely through a Web browser. With SamePage Intranet Work Processor, individuals who need to collaborate on a project can use a browser to insert their comments into a document concurrently.

When they settle on a final version, their work can be converted to an external file format for publication.

"[WebFlow is] among the first to show a vision and understanding of how collaboration works using Internet tools," said Allen Weiner, director and principal analyst of on-line strategies at Dataquest, Inc.

The NT-based system costs $3,500 for a 10-user setup.

■ Electronic Book Technologies, Inc. (EBT), headquartered in Providence, R.I., will unveil its new DynaBase WebManager system that combines both content management and Web site development tools into a single product.

With the software, any number of contributors can participate in the creation of a World-Wide Web site from remote locations with a drag-and-drop interface, and they are free to use whatever Web authoring tools they prefer.

The beta is due out in June, and the final product is scheduled to ship in August. Pricing is $2,500 for a 10-user workgroup.

The client and server software will run on Windows NT initially, with Unix to follow within 90 days.

■ NetCarta Corp. of Scotts Valley, Calif., will unveil server software that will enable Webmasters to manage sites, track changes and publish easy-to-read maps for users scanning their pages.

With WebMapper, an administrator can manage local Windows-based Web servers or remote Web servers of any type.

■ DocuMagix, Inc. of San Jose, Calif., will show off HotPage, a plug-in for Netscape Communications Corp.'s Navigator browser that captures, organizes and manages Web and intranet information in a "filing cabinet" inside a user's PC.

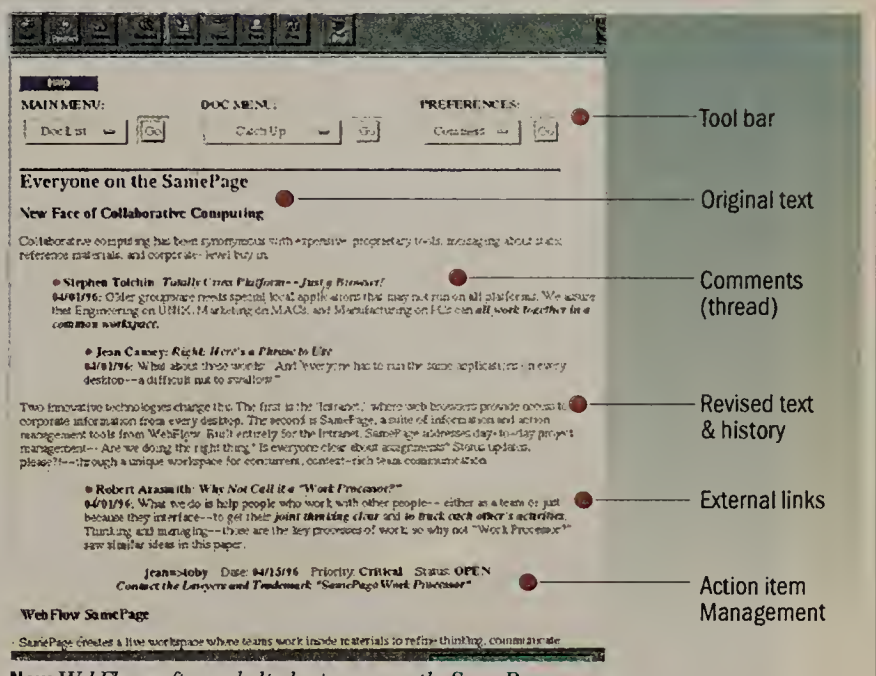
Users can save Web pages with live URLs, as well as the artwork, for reading off-line or storing for future use.

The HotPage software, due out in May, sells for $39. With a Navigator 2.0 browser, it's $79.

■ Performance Technology, Inc., a San Antonio, Texas-based subsidiary of Bay Networks, Inc., will announce a new version of its hardware/software product for connecting up to 50 concurrent users of a NetWare, PowerLAN or any IPX-capable network to the Internet. Instant Internet Version 3.1 has a built-in 128K bit/sec Multilink PPP ISDN connection that delivers twice the bandwidth of the prior version.

Instant Internet 3.1 will be available in June. The modem version is priced at $3,495 for a single Ethernet unit, $3,745 for dual Ethernet and $4,395 for token ring. The respective ISDN versions list at $4,195, $4,545 and $5,095. Upgrades from Version 3.0 to 3.1 are free.

✆WebFlow: (408) 235-1400; EBT: (401) 421-9550; NetCarta: (408) 461-8920; DocuMagix: (800) 362-8624; Performance Technology: (210) 979-2000.

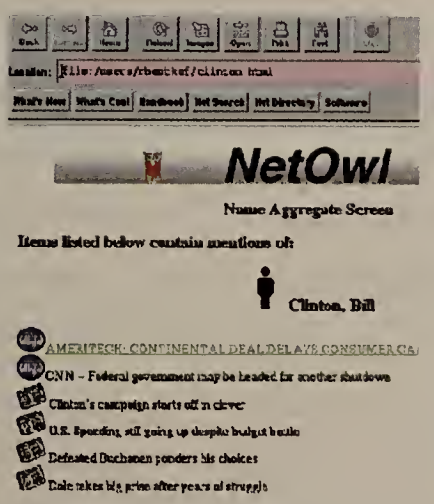


New *WebFlow software helps keep users on the SamePage.*

SRA's new mission: Search and retrieve

By Ellen Messmer
Arlington, Va.

SRA International, Inc. this week will unveil search and retrieval software that lets browsers index, find and distribute documents across the corporate intranet.



SRA's *NetOwl software indexes intranets for speedy searches.*

With the server-based software, called NetOwl, companies can index their internal documents, photos, stock quotes or incoming news feeds. Corporate users with a standard HTML browser can search for information by name, place, date or monetary expression.

NetOwl makes use of SRA's NameTag indexing software, modified for use on a World-Wide Web-based corporate intranet. Users can set up an electronic index on a database in the company's Web server that can control access to sensitive documents. That way, for example, only authorized employees can re-trieve reports on finance or human resources.

Authorized users querying the NetOwl search engine on a topic, which rips through 35,000 characters per second in its hunt, can launch a request to retrieve the information via hypertext from a local or remote server.

NetOwl also includes a set of addresses for information resources on the Internet, so it can be used as the search engine for the public Internet, too.

Managing NetOwl is expected to fall to the corporate Webmaster, said Paul Jacobs, product marketing director at SRA. "The Webmaster sets up NetOwl on the Web server, and configures it to index and focus on particular content," he said.

"The major challenge for the intranet is getting the documents and deciding which ones to index," he said.

However, the difficult part is coordinating the indexing effort with the many divisions of a corporation that may want to make use of the NetOwl search engine, Jacobs said.

Take an Intermezzo

Because companies may already be employing other database search tools, SRA has come up with middleware software, called Intermezzo, that allows NetOwl to conduct searches through other types of search engines, as well.

Intermezzo can use NetOwl to do name-based, natural-language search and image retrieval in Verity, PhotoFile, Excalibur/Conquest and Fulcrum search servers.

NetOwl can also hunt through servers based on the Wide Area Information Server protocol.

The NetOwl server software, which costs $4,995, will ship in June. Intermezzo, not yet priced, is slated for July delivery.

✆SRA: (703) 558-4700.

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Circle Reader Service #46

The Internet rocks EDI boat

By Ellen Messmer
Chicago
What a difference a year makes.

The sober-minded managers from he Fortune 1000 companies that last ear flocked to electronic data inter-hange conferences hardly mentioned he Internet without shaking their heads n disapproval.

This month, the Internet was the desig-nated conference theme at two major EDI hows — the Data Interchange Standards Association meeting in New Orleans and he Corporate EFT/Financial EDI Con-erence here.

Analyst *Jack Shaw predicts "virtually all EDI will take place on the Internet" in 10 years.*

EDI managers do iot seem ready to bolt n masse from the DI value-added net-vorks (VAN) where hey pay by the byte to ransmit their EDI lata to trading part-ners. But the lure of he Internet, with its lat-rate price, com-non network stan-lards, and worldwide inks to electronic nail and the Web, is ecoming irresistible to many, in spite of ualms about hackers and the Internet's ack of end-to-end network management.

"Ten years from now, virtually all EDI vill take place on the Internet," predicted nalyst Jack Shaw, president of Marietta, Ga.-based consultancy Electronic Com-nerce Strategies, Inc. Shaw said time-ensitive EDI shipping data may not ride n the Internet, but most other data will.

Internet mail and the Web are increas-ngly viewed as easier, less expensive ways o carry EDI data, and this means smaller usinesses do not have to invest in EDI ranslators or mapping software.

Banking on EDI

Despite the obstacles, EDI on the Inter-iet is taking off. BankAmerica Corp. and Banc One Corp. are already processing ayment information over the Internet. And just last week, First Union Corp. lescribed plans to sell Web-based EDI oftware to its business customers for nvoices as well as purchase and payment rders.

Rick Hollar, First Union's senior elec-ronic commerce product developer, said ank customers could post EDI templates n their Web sites, and their trading part-ners would simply fill in the business data.

First Union has a deal with MCI Com-nunications Corp. to transmit EDI data in olume for a low price, "if we bring them a nass of customers," Hollar said.

"The potential is unbelievable," said Warren Eastman, First Union assistant ice president. "A year ago, I had never been on the Internet and barely knew what it was. Now we have 25 people dedi-cated to it."

Some banks are taking a different path o EDI. Wells Fargo Bank will soon start sharing EDI data as message attachments shielded through the Secure Multipur-pose Internet Mail Extension encryption standard. "We're working on it, and we're getting into production now," said Vince Hruska, vice president and manger of electronic products at Wells Fargo.

But there is still widespread debate about whether the Internet is really such a good bet for sending critical business data.

Jim Crouse, EDI product manger for the IBM Global Network, pointed out that VANs generally are set up to account for every message that passes across their net-work, but Internet service providers are not.

About 100,000 organizations today conduct business using EDI, largely with the VANs. But EDI users, which embraced EDI because their largest business cus-tomers demanded it, will not march to the Internet until the pressure is there, said Bruce Gore, EDI manager at Southwire Co. in Carrollton, Ga.

"With congestion on the Internet and the hackers, it's not time, in my opinion," Gore said. But he added that when South-wire's customers call for EDI on the 'Net, "we'll be there." ■

Will the Internet bring an end to business computing as we know it?

Not at all. It will simply knock down the walls between users and the information they need.

What was once thought to be a lofty dream is about to come true: access to any fact or figure, at anytime, from any place. Happily, those who've begun the transition to client-server already have much of what they need in place. And to help businesses incorporate the Internet/intranet into their operations, Microsoft is integrating the necessary technology into many of its products — from desktop to server to tools.

For example, it's never been easier to connect desktops to the Internet. That's because both Microsoft® Windows® 95 and Windows NT® Workstation operating systems have all the "plumbing" built right in. Viewing content is just as effortless. With Microsoft Internet Explorer, users can browse the Internet (or internal corporate webs) whether they're working on the Windows platform or on the Macintosh.™

Of course, making web content easy to view is only the beginning. To be useful to organizations, content has to be easy to create, too. Which is why the latest generation of Microsoft Office applications, along with Internet Assistants, allow users to develop web content without programming. They simply save their work as HTML, the way they would any other document. Such ease-of-use also extends to the newest member of the Microsoft Office family, the Microsoft FrontPage™ web authoring tool, which lets users create and manage entire web sites, even if they've never so much as programmed a VCR.

The Internet is very much a part of our BackOffice™ family, too. With Microsoft Internet Information Server, we've extended the performance of Windows NT Server to make the ideal Internet platform. Now every organization can host and manage web content and applications securely and reliably. And, with Microsoft Exchange Server, secure and reliable e-mail is also a reality, whether it's traveling over the Internet or within your organization.

The truly interactive web page has arrived as well...and with it, full motion video, audio and moving text. Advances made possible by technologies like ActiveX™ controls, which let developers embed sound, video, and applications without having to learn new languages.

Yes, the walls are coming down, but it's not the end of business computing. Just the next, most practical evolution.

To learn more, or to download our free Internet products, visit http://www.microsoft.com/internet/go8/

Georgia puts brakes on Web imposters

State enforces law that punishes people who send misleading data.

By Carol Sliwa

The state of Georgia's newly enacted law forbidding anyone from transmitting misleading data over the Internet has caused a stir in certain electronic circles.

The Electronic Frontier Foundation (EFF), a cyberspace watchdog group, claims the law will make it a crime to use someone else's trademark in user identifications and domain names. It also renders the use of pseudonyms a criminal act. The EFF's biggest beef is that the law makes it illegal for a user to link from a home page to another site without permission.

Hogwash, said the bill's sponsor, Rep. Don Parsons from Cobb County.

Parsons — a self-described Jeffersonian Republican who says he takes freedom of speech issues seriously — said he consulted the American Civil Liberties Union when drafting the bill. He said the bill simply sets up a misdemeanor violation for those that knowingly falsely identify their home page or site as belonging to another individual, company or organization, or falsely state or imply they received permission to author the Web site of another.

"End users have some rights, too," Parsons said. "They have the right to expect that the home page they visit is for the person or the company or the organization that it is presented to be for."

The Georgia legislator said he got the idea for the bill after hearing a radio broadcast reference to Internet pages disseminating medical and health-related information. He was concerned that someone might be harmed by false information.

To further illustrate his point, Parsons said a political opponent might set up a home page with Parsons' campaign logo and list positions that are contrary to his own. "But the person who looks at it, they think it's the home page of Don Parsons' election committee," he said.

Download the Georgia antilink bill via Network World Fusion Select News+ then Intranets and the 'Net.
http://www.nwfusion.com

As happens with many bills, Parsons' original proposal was modified, and changes intended to clarify the bill have led to unintended consequences. The main section is hardly a simple declarative sentence. Quite the contrary, it is a 150-word-plus sentence with a series of repetitive phrases that can obstruct the main point.

The EFF's said the new law, which will take effect on July 1, is "poorly crafted" and that it is an "unconstitutional restraint on the free speech rights of the citizens of Georgia, the United States and the Internet [and will] significantly hamper the development of the Global Information Infrastructure."

The EFF, through staff counsel Shari Steele, sent a letter to Georgia officials pointing out that the law makes it illegal for a sender of mail to "falsely identify" him or herself. But user IDs typically are not the person's full name, Steele noted.

Steele also contends that the bill would make it illegal to create a button on a World-Wide Web site with a trade name or logo without first obtaining permission or authorization from the owner or author.

She cited the example of the EFF's Web site link pointing users to *Wired* magazine. That would be illegal without permission under the new Georgia law, she asserted.

Parsons, on the other hand, claims the bill only applies to authors of Web sites. For instance, EFF could not create a Web site for *Wired* magazine without permission. Inserting a simple referral onto a site is fine, Parsons said.

Who will be the final arbiter? Even if Steele's fears are well founded, violators will not be getting locked up by a cyber-space police force. Parsons said the law will be enforced by aggrieved parties who bring their complaints to the courts. ■

Paul **Severino**
Chairman
Bay Networks, Inc.

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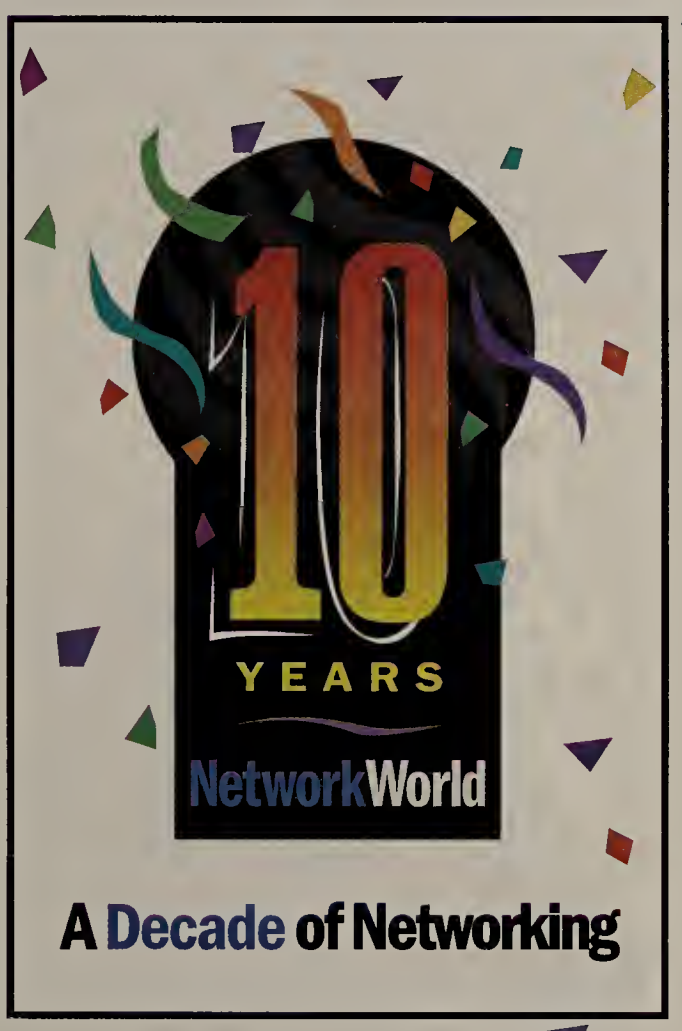
"Congratulations to *Network World* for 10 years of excellent coverage on internetworking. As 1996 marks the year of the switching revolution and the Internet, we look forward to another decade of distinguished news reporting and analysis from *Network World*."



Gail **McGovern**
Executive Vice President
Business Markets Division
AT&T

Happy Anniversary!

"Over the past ten years, I've been excited to read about and be part of the tremendous impact technology has had on networking. If there's a lesson to be learned, it's that the value of networking — and people's expectations — have nowhere to go but up."

Craig **Benson**
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Best Wishes!

"*Network World* has served the information systems and business communities well for 10 years, describing and defining the evolution of networking. As we rapidly approach a world that is network-centered — in our personal as well as business lives — you have a much vaster opportunity to communicate networking's benefits. Congratulations."

Dr. Robert M. **Metcalfe**
Ethernet inventor, 3Com founder, and
Vice president/technology, IDG

Congratulations!

"Have we had 10 years of *Network World* already? It's amazing how quickly all of this networking stuff has happened. We would have been lost without *Network World* to guide us throughout it. Congratulations."

Eric **Cooper**
Chairman/Chief executive officer
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"Congratulations on 10 years of excellence in covering the world of networking. Best wishes for the next decade from FORE Systems."

Best Wishes!

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Network World *tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at cnerney@nww.com or fax at (508) 820-1103.*

I'm having problems setting up Microsoft Corp.'s Windows 95 operating system to dial in to a server with Novell, Inc.'s NetWare 4.0 Connect. I use a Windows logon with TCP/IP. When I connect, I get an acknowledgement, but then a message says no services are available at this time.

Mark Tibor, via the Internet

Check out Novell's "Win95 and Dialer" technical document (TID2905149), suggests Dave Kearns, a consultant in Austin, Texas.

To execute NetWare Connect Windows Dialer on Windows 95, it may be necessary to modify the autoexec.bat file in the C:/directory, the document says. Comment out (add "rem" at the beginning of the line) on the C:/WINDOWS/LSL.COM and C:/WINDOWS/PXOD1.COM commands if they are in the autoexec.bat file. Make sure that @CALL C:/NWCLIENT/STARTNET.BAT is in the autoexec.bat file.

After you've checked the autoexec.bat file, reboot Windows 95 and load the remote client software. Following that, click the Start button, point to Programs then Netware Remote Client 2.0. Click on the Remote Client dialer.

Lastly, configure the dialer and then dial in to the LAN via a PPPRNS connection.

We have enabled TCP/IP services on a Windows NT server so we can access the Internet via a service provider; we use a 28.8K bit/sec modem.

Everything was working fine, then one day we could not get access past our service provider for Web browsing even though we did not make any changes. We tried using the ROUTE DELETE function to get around a possible sticking point, but the server would not let us. Do you have any suggestions?

Doug Ehrreich, Braemar, Inc., Burnsville, Minn.

The solution should be simple. Try ROUTE-F ADD (route to the Internet service provider machine), Kearns says.

Picking the right service class for different ATM applications

By Andrew Greenfield

One of Asynchronous Transfer Mode's distinguishing features is its ability to handle many types of information — text, graphics, audio and video — on a single network. This application integration is made possible because of the different classes of service defined for ATM.

With ATM, network managers do not need to run multiple networks to support different traffic types. Instead, they have to match specific application needs to the appropriate service class. The ATM Forum has defined four classes of service. They are: constant bit rate (CBR), variable bit rate (VBR), unspecified bit rate (UBR) and available bit rate (ABR).

UP CLOSE

Filling the ATM trunk

By combining different ATM classes of service, network managers can obtain full network bandwidth utilization. They can use the available and unspecified bit rate services to take advantage of bandwidth that has been reserved for other applications when those applications are not using it.

Basic service attributes

CBR service provides a fixed amount of bandwidth, making it analogous to a T-1 line, for example. It is appropriate for applications that transmit a constant stream of information. This typifies voice, circuit emulation or compressed video.

In order to handle such delay-sensitive applications, CBR service imposes stringent limitations on network delay and delay variation.

VBR service provides a maximum bandwidth guarantee but comes with the understanding that such capacity will not be needed at all times. It is designed to transport applications that run at variable rates, such as a voice call that uses silence suppression.

The UBR and ABR services better address the needs of LAN internetworking and other bursty data applications. They provide a way to utilize the bandwidth that is not consumed by CBR or VBR services.

UBR is a best-effort service: It provides no bandwidth promise or guarantee against cell loss or delay. In essence, users of a UBR service accept whatever bandwidth is available and know that data can be discarded should congestion occur.

Realistically, few applications outside off-hour batch file transfers can tolerate this level of uncertainty. Additionally, few network managers can tolerate the idea of indiscriminate discards since the loss of a single cell requires an entire data packet be retransmitted.

Used with UBR, a technique known as Early Packet Discard (EPD) attempts to reduce the performance impact of cell discards. It drops complete packets rather than single cells.

ABR provides minimum bandwidth guarantees and protection against cell discards. This service is well matched to a broad range of applications, including LAN internetworking, since it is intended for applications with highly variable bandwidth requirements.

With ABR, users state the minimum bandwidth required by their application and the network guarantees this bandwidth. When additional capacity is available, users can burst above the minimum guaranteed bandwidth without risk of cell discards.

At the simplest level, ABR can be supported by switches that can set the congestion bit in ATM cells. However, the real benefits of ABR come with higher levels of support, which require separate queues for each virtual circuit and the ability to process explicit rate cells. These protect the network against misbehaving users and ensure fair allocation of bandwidth.

ABR-enabled switches use a flow control mechanism that monitors the availability of bandwidth throughout the network and passes feedback to ATM switches and network users. This information is used to increase or decrease the available bandwidth for each user. Bursts of traffic in excess of the available bandwidth can be buffered by the user device or switches for transmission as bandwidth allows.

While the CBR, VBR and UBR services have been defined for some time and are widely supported, the ATM Forum is just now finalizing the ABR standards. Network managers should expect to see products supporting ABR available near the end of this year.

Class specificity

Network managers have a number of ways to map traffic to the right class and quality of service parameters. For example, users can specify a particular service class from their application software by requesting an ATM connection that includes the appropriate quality of service characteristics. Alternatively, network managers might specify the appropriate class of service when setting up a permanent virtual circuit between routers.

One of the basic benefits of ATM is the cost reduction made possible by eliminating separate networks and equipment for different application types. ATM service classes enable this network integration by allowing each type of traffic to be handled efficiently while continuing to guarantee the service quality that it requires.

Greenfield is director of marketing at StrataCom, Inc., a San Jose, Calif.-based supplier of wide-area ATM switches. He can be contacted at (408) 294-7600.

Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Beth Schultz by phone at (312) 283-0213 or via the Internet at bschultz@nww.com.

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EDITORIAL INSIGHTS

Where do we go from here?

Like many of you, I got into networking by chance rather than design. Ten years ago, *Network World* founding Editor Bruce Hoard asked me to be managing editor of this new weekly publication.

Ripe with two years' experience, I was the ideal candidate. I had no supervisory skills, knew nothing about nets, had never edited and wasn't that good at getting news. But managing seemed easier than real work, so I went along. This despite colleagues who said, "You want to write about Ethernet?"

In retrospect, getting my arms around such arcana as collision detection and IP tunneling turned out to be considerably more difficult than working my old software beat, particularly since Computer Associates acquired every company I covered.

In any case, it's been 10 years since the 24 charter members of the editorial team — we number nearly twice that now — struggled on a 3Com 3+ LAN to put out the first issue of *Network World.* (Sometime, over a beer, I'll tell you about the day our server went up in flames.) Since then, by dint of good timing or sheer luck, we — and you — have found ourselves in the middle of something the whole world is talking about. RBOCs are in the midst of mega-mergers, Internet start-ups unhindered by revenue are taking Wall Street by storm, 20-something Webmasters are pulling down jaw-dropping starting salaries, and companies are racing like driver ants to put up Web pages.

We all look pretty smart now. Opportunities beckon.

But the trade-off is we are beeped and buzzed and E-mailed and cell-phoned into a state of urgency. We fight fires and bolt down the next big gulp of technology dumped on our plates.

While our stock rises in the eyes of others, inwardly we feel a quiet desperation. Are we developing any lasting expertise? Are we heading in the right direction, or will we wind up replaced by an outsourcer or an intelligent, Web-crawling agent? Are we focusing on the big opportunities or the plumbing?

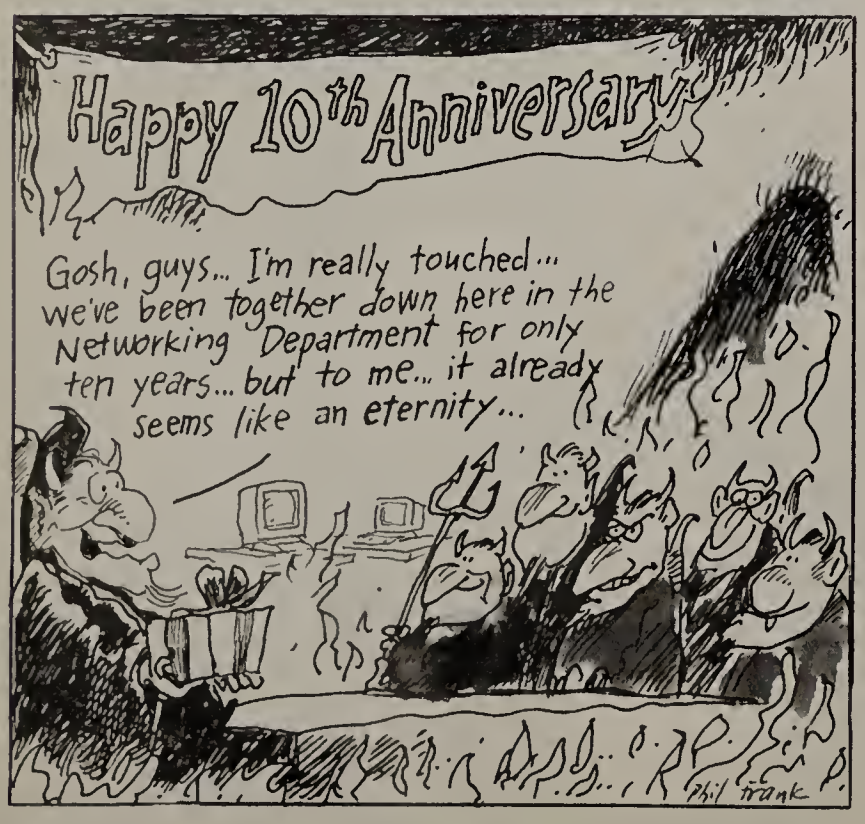
We have big bandwidth and group scheduling and remote access and videostreams and attached files . . . and no time to think.

So 10 years out, we're pausing to ponder about the big shifts and challenges ahead. Enjoy this forward-looking special issue. I hope it makes you think about where you want to be in 10 years.

John Gallant, editor in chief jgallant@nww.com

Teletoons

By Phil Frank and Joe Troise
guru@well.com



NETWORK CONVERGENCE

Bigger Bells may not be better at providing sophisticated solutions

Mary Johnston Turner

The recent Bell Atlantic Corp./NYNEX Corp. and SBC Communications, Inc./Pacific Telesis Group mergers are clearly motivated by the RBOCs' quest for dominance in long-distance markets and control of consumers' communications spending. Access to video and on-line markets, and the ability to provide customers with one-stop access to wireless, video, local and long-haul service are noted as major benefits of these deals. But what do these mega-mergers mean to the average enterprise network manager?

For starters, they mean long-distance price wars are just around the corner. For commodity services such as switched voice, the regional Bell operating companies may become attractive, low-cost suppliers. However, it is unlikely they will quickly become leading suppliers of the more complex technical services — such as frame relay, ATM and Internet access — needed to support corporate distributed computing, electronic commerce or multimedia.

The RBOCs are going for volume, plain and simple. They will prioritize commodity services and leave the complex solutions for the interexchange carriers (IXC); smaller, nimbler and more technologically advanced companies such as BBN Planet; or competitive access providers (CAP) such as MFS Communications Company, Inc.

In the near to mid-term, the RBOC mergers can only be a good thing for corporate net managers if the mergers help to push down prices across the country.

The RBOC mergers are based on a couple of fundamental assumptions about the ongoing evolution of the telecommunications market.

First, the RBOCs assume that economies of scale can be realized quickly by expanding the addressable market available to any one of the consolidated companies. Hence, the need for broader geographic coverage.

Furthermore, the RBOCs expect to reduce costs by quickly shedding duplicate jobs and consolidating overlapping billing and operational support systems.

But at the end of the day, one RBOC's infrastructure and suite of services are more or less the same as another's. They all buy their hardware — and, increasingly, off-the-shelf management systems and software — from the same set of vendors. They all rely on the same basic standards to define communications services.

As a result, there isn't much left to drive differentiation and competitive advantage. In consumer markets, access to and control of programming and information content may provide differentiation. But on the corporate services side, it's hard to find anything that will clearly differentiate one of these consolidated RBOCs from one another. Price and brand image are about all that is left.

It is possible that the merged RBOCs have figured out the right formula for winning consumer dollars — if you believe consumers are poorly informed, technophobic, time-constrained buyers who value one-stop shopping and are brand-loyal. However, for corporate network managers, it's clear that this one-size-fits-all approach to telecommunications will be of little impact after 10 years of highly competitive markets and several years of Internet mania have taken a toll.

Corporate net managers long ago gave up on the RBOCs for complex enterprise network solutions. Sure, the RBOCS have provided bulk access to IXCs, but they have been largely unable to win accounts that value national coverage, sophisticated data services and complicated system integration.

Telecommunications reform simply confirms what most corporate users have known for several years — that choice among telecommunication service providers is a de facto reality. At least in major metropolitan areas, carriers such as MFS and Teleport Communications Group have been providing competitive access for years. It is no wonder that AT&T recently announced deals with five CAPs as a way to offer integrated local and long-distance service without using RBOC facilities.

For a number of years now, corporate users have realized they do not have to buy all services from one supplier. In fact, due to concerns about disaster recovery, most midsize and large corporate customers use services from at least two long-distance providers. If one has a major outage, the other can take up the load.

With the emergence of wireless and Internet services, corporate accounts have generally sought the best deal for the specific type of service. When all else is equal, price will carry the day, but only after the astute net manager has checked out capabilities and references. Putting two RBOCs together doesn't make the new company any more sophisticated than the two old companies.

In the near to mid-term, the RBOC mergers can only be good for corporate net managers if the mergers help to push down prices across the industry. However, after the initial fire sales of brand commodity services have come and gone, net managers will be just where they started — searching for the best provider of sophisticated communications solutions in a rapidly changing world.

It is unlikely the RBOCs will be any higher up the sophistication scale than they have been since divestiture. In fact, the emphasis on consumer markets might inch them down that scale in the eyes of corporate users.

But then again, the RBOCs may not care. If the consolidated RBOCs can indeed corner consumer markets, they may be just as happy leaving demanding corporate accounts to others who are willing to innovate and do the amount of hand-holding required to keep business users happy.

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1 Industry: (check one only)

01. ☐ Manufacturers (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/ Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consultants (Independent)
16. ☐ Carriers/Interconnects
17. ☐ Manufacturers (Computer/Communications)
18. ☐ Resellers of Computer/Network Products (VARs, VADs, Distributors)
19. ☐ Systems/Network Integrators
20. ☐ Distributors (Computer/Communications)
21. ☐ Other *(please specify)*_____

2 What is your job function? (check one only)

NETWORK IS MANAGEMENT:

1. ☐ Networking Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS, IT, MIS, Systems Management
5. ☐ Engineering Management
6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management)
7. ☐ Consultant (Independent)
8. ☐ Other *(please specify)*_____

3 What is the total number of sites for which you have purchase influence? (check one only)

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1
7. ☐ None

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)
1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT (check all that apply)
1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5 Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:
B. I plan to purchase the following products/services:

A	B	
❑ 100	❑	**LOCAL-AREA NETWORKS**
☐ 01.	☐	Local-Area Networks
☐ 02.	☐	Network Op. Sys. Software
☐ 03.	☐	LAN Storage/Backup
☐ 04.	☐	Optical LAN Storage/Backup
☐ 05.	☐	Disk LAN Storage/Backup
☐ 06.	☐	Tape LAN Storage/Backup
☐ 07.	☐	RAID LAN Storage/Backup
☐ 08.	☐	Network Test/Diagnostic Tools
☐ 09.	☐	Cables, Connectors, Baluns
☐ 10.	☐	UPS
☐ 11.	☐	Network Interface Cards
☐ 12.	☐	Peer-to-Peer LANs
☐ 13.	☐	SNMP Network Management
☐ 14.	☐	ATM Switches
☐ 15.	☐	Token-Ring Switches
☐ 16.	☐	Ethernet Switches
☐ 17.	☐	Remote LAN Access/Communications Servers
☐ 18.	☐	Superservers
☐ 19.	☐	File/Application Servers
☐ 20.	☐	Print Servers
❑ 101	❑	**INTERNETWORKING**
☐ 21.	☐	Bridges
☐ 22.	☐	Routers
☐ 23.	☐	Bridge/Router
☐ 24.	☐	Gateways
☐ 25.	☐	Intelligent Hubs/Stackables
❑ 102	❑	**COMPUTERS/PERIPHERALS**
☐ 26.	☐	Laptops/Notebooks/Sub-Notebooks
☐ 27.	☐	Micros/PCs
☐ 28.	☐	Minis
☐ 29.	☐	Mainframes
☐ 30.	☐	Workstations
☐ 31.	☐	Terminals
☐ 32.	☐	Printers
☐ 33.	☐	Cluster Controllers
☐ 34.	☐	Monitors
☐ 35.	☐	Fax/Modem Boards
❑ 103	❑	**REMOTE/WIRELESS COMPUTING**
☐ 36.	☐	PDAs
☐ 37.	☐	PCMCIA Devices
☐ 38.	☐	Wireless Data Services
☐ 39.	☐	Wireless Data Equipment
☐ 40.	☐	Wireless LANs
☐ 41.	☐	Cellular Equipment & Services
❑ 104	❑	**INTERNET/ELECTRONIC COMMERCE**
☐ 42.	☐	Internet Access Providers
☐ 43.	☐	Firewalls
☐ 44.	☐	Web Servers/Browsers
☐ 45.	☐	Internet Software Tools
❑ 105	❑	**SOFTWARE/APPLICATIONS**
☐ 46.	☐	Network Management
☐ 47.	☐	Systems Management
☐ 48.	☐	Security
☐ 49.	☐	Communications Software
☐ 50.	☐	Terminal Emulation
☐ 51.	☐	Word Processing
☐ 52.	☐	Operating Systems
☐ 53.	☐	Client/Server Applications Development
☐ 54.	☐	Database Management/RDBMS
☐ 55.	☐	Spreadsheet
☐ 56.	☐	Groupware
☐ 57.	☐	EDI
☐ 58.	☐	E-mail
☐ 59.	☐	Windows/Graphical User Interface
☐ 60.	☐	Multimedia
☐ 61.	☐	Graphics/DTP
☐ 62.	☐	Remote Access
☐ 63.	☐	Imaging
☐ 64.	☐	Suites
☐ 65.	☐	Middleware
☐ 66.	☐	Document Management
☐ 67.	☐	Database Server
☐ 68.	☐	Site Metering Tools
☐ 69.	☐	Computer-Integrated Telephony (CIT)
❑ 106	❑	**WIDE-AREA NETWORK EQUIPMENT & SERVICES**
☐ 70.	☐	Frame Relay Equip./Services
☐ 71.	☐	Modems
☐ 72.	☐	FT-1/T-1/T-3 Multiplexers
☐ 73.	☐	FT-1/T-1/T-3 Services
☐ 74.	☐	SONET
☐ 75.	☐	Inverse Multiplexers
☐ 76.	☐	SMDS
☐ 77.	☐	Asynchronous Transfer Mode
☐ 78.	☐	Diagnostic/Test Equipment
☐ 79.	☐	DSU/CSU
☐ 80.	☐	VSAT/Satellite
☐ 81.	☐	ISDN Equipment & Services
☐ 82.	☐	PBXs
☐ 83.	☐	Voice Mail/Response
☐ 84.	☐	Videoconferencing
☐ 85.	☐	Leased Lines
☐ 86.	☐	Switched Data
☐ 87.	☐	E-mail/On-line Services
☐ 88.	☐	800/900/MTS Services
☐ 89.	☐	Virtual Networks
☐ 90.	☐	Outsourcing/Systems Integration Services
☐ 91.	☐	Education/Training Services
☐ 92.	☐	None of the above (1-91)

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6 What is the total number of LANs, workstations/nodes at this location/ in your organization?

	At this location: LANs	At this location: Workstations/ Nodes	Entire organization: LANs	Entire organization: Workstations/ Nodes
1.	☐ 5,000+	☐	☐ 5,000+	☐
2.	☐ 1,000 - 4,999	☐	☐ 1,000 - 4,999	☐
3.	☐ 100 - 999	☐	☐ 100 - 999	☐
4.	☐ 50 - 99	☐	☐ 50 - 99	☐
5.	☐ 10 - 49	☐	☐ 10 - 49	☐
6.	☐ 1 - 9	☐	☐ 1 - 9	☐

7 Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:
B. The following network platforms are planned for purchase:

A	B	
❑ 55	❑	**NETWORK ARCHITECTURES**
☐ 01.	☐	SNA
☐ 02.	☐	DECnet
☐ 03.	☐	TCP/IP
☐ 04.	☐	Novell IPX/SPX
☐ 05.	☐	APPC/APPN/LU 6.2
☐ 06.	☐	NETBIOS
☐ 07.	☐	AppleTalk
☐ 08.	☐	NFS
☐ 09.	☐	Other *(please specify)*_____
❑ 56	❑	**NETWORK OPERATING SYSTEM**
☐ 10.	☐	Microsoft (LAN Manager)
☐ 11.	☐	Novell (NetWare 2.X, 3.X)
☐ 12.	☐	Novell (NetWare 4.X)
☐ 13.	☐	Windows NT
☐ 14.	☐	Windows NT/Advanced Server
☐ 15.	☐	LocalTalk (AppleTalk)
☐ 16.	☐	Banyan (VINES)
☐ 17.	☐	IBM (LAN Server)
☐ 18.	☐	IBM (PC LAN Program)
☐ 19.	☐	Artisoft (LANtastic)
☐ 20.	☐	Digital (Pathworks)
☐ 21.	☐	Other *(please specify)*_____
❑ 57	❑	**LAN ENVIRONMENT**
☐ 22.	☐	4M Token Ring
☐ 23.	☐	16M Token Ring
☐ 24.	☐	Ethernet
☐ 25.	☐	100M Ethernet
☐ 26.	☐	StarLAN
☐ 27.	☐	FDDI
☐ 28.	☐	LocalTalk
☐ 29.	☐	10Base-T
☐ 30.	☐	ATM
☐ 31.	☐	Other *(please specify)*_____
❑ 58	❑	**COMPUTER OPERATING SYSTE**
☐ 32.	☐	DOS
☐ 33.	☐	Unix/Xenix/AIX
☐ 34.	☐	OS/2
☐ 35.	☐	OS/2 Warp
☐ 36.	☐	IBM MVS
☐ 37.	☐	IBM VM
☐ 38.	☐	Digital VMS
☐ 39.	☐	Macintosh
☐ 40.	☐	Windows
☐ 41.	☐	Windows 95
☐ 42.	☐	X Window System
☐ 43.	☐	Solaris
☐ 44.	☐	Other *(please specify)*_____
☐ 45.	☐	None of the above (1-44)

8 For which areas outside of North America do you have purchase influe (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ None

9 Do you have or plan to install client/server networks? ☐ Yes ☐ No

10 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes A – Installed	Mainframes B – Planned		Minis C – Installed	Minis D – Planned
1.	☐ IBM	☐	1. IBM	☐	☐
2.	☐ Amdahl	☐	2. Digital	☐	☐
3.	☐ Cray	☐	3. Tandem	☐	☐
4.	☐ Hitachi	☐	4. Unisys	☐	☐
5.	☐ Unisys	☐	5. AT&T GIS	☐	☐
			6. HP	☐	☐
			7. Data General	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ON

	At this location: E – Servers	At this location: F – Clients/Nodes	Entire organizati G – Servers	Entire organizati H – C
1. Power PC				
2. Power Macintosh				
3. Macintosh (Other)				
4. Pentium-based				
5. 80486-based				
6. 80386-based				
7. 80286-based				
8. RISC-based workstations				
9. Other				

11 What is the estimated value of networking equipment and services th help specify, recommend or approve annually? (check one only)

01. ☐ $100 million or more
02. ☐ $50 million - $99.9 million
03. ☐ $25 million - $49.9 million
04. ☐ $20 million - $24.9 million
05. ☐ $10 million - $19.9 million
06. ☐ $5 million - $9.9 million
07. ☐ $1 million - $4.9 million
08. ☐ $500,000 - $999,999
09. ☐ $250,000 - $499,9
10. ☐ $249,999 or less
11. ☐ None of the abov

12 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ $10 billion or more
2. ☐ $1 billion to $9.9 billion
3. ☐ $500 million to $999.9 million
4. ☐ $100 million to $499.9 million
5. ☐ $50 million to $99.9 million
6. ☐ $10 million to $49.9 million
7. ☐ $5 million to $9.9
8. ☐ $4.9 million or le
9. ☐ None of the abo

13 Estimated number of employees at this location/in entire organizati

At this location:		Entire organization:	
1. ☐ Over 10,000	4. ☐ 1,000 - 2,499	1. ☐ Over 10,000	4. ☐ 1,000
2. ☐ 5,000 - 9,999	5. ☐ 500 - 999	2. ☐ 5,000 - 9,999	5. ☐ 500 -
3. ☐ 2,500 - 4,999	6. ☐ 499 or less	3. ☐ 2,500 - 4,999	6. ☐ 499 o

NETWORK WORLD'S 10TH ANNIVERSARY

Looking back on a decade of GUI-ization . . .

If you ask 10 people what was the single most significant development affecting the networking industry over the past 10 years, you're likely to get — as I did — 10 very different responses.

One person, an engineer, touted Category 5 unshielded twisted pair as the greatest technical development since the wheel. Another, a product manager with an undergraduate degree in philosophy and an MBA, saw networking — and most industry, for that matter — in general decline due to the decay of morality and scruples in the business world.

I can't really disagree with either, or with any of the responses. But none hits on what I consider the most far-reaching development of the past 10 years: the GUI.

Think about it. If it wasn't for the GUI, information technology today would still be ruled by an elitist sect of technonerds, who alone know the appropriate incantation to enter at the command line to get the system to perform the desired action.

I think there was an unwritten rule somewhere that the complexity of the command line had to increase proportionately with the relative power of the hardware platform.

Edwin Mier

The DOS command line wasn't too ominous. But how many of us really knew more than the handful of commands we needed to move a file or check a directory?

From there, you entered the world of Unix. A lot of mere mortals could "cd" and "ls" their way around. But to get a shell script, you had to make an appointment with the Unix system guru.

IBM mainframes? You had to be a polyglot to address more than one mainframe operating environment: a TSO session represented the interactive command system for MVS users; for VM, there was the equally arcane but totally different VM user logon.

Now not all attempts at GUI-ization have been successful. Microsoft's Windows and, most recently, Windows 95 have pretty much done away with the DOS command line — although it still lurks somewhere in the background.

But the GUI-ization of Unix hasn't made the same progress. Despite GUI command lines painstakingly developed by Unix vendors, the Unix system gurus I know still prefer their raw command lines.

Still, the GUI-ization of networking is proceeding, I'm glad to report. We recently lab-tested the latest versions of leading network management software packages — including HP's OpenView 4.1 and IBM's NetView 4.1 — and found some interesting differences. (You'll see the results in a few weeks.)

IBM's engineers succeeded in GUI-izing a process called the Agent Policy Manager, in which the user points and clicks the setup of thresholds based on Boolean logic in remote management stations. It takes some getting used to, but you don't have to be a programmer or mathematician to make it work.

Much of the new functionality in HP's latest package involves the setup of filters by the user. But HP hasn't yet GUI-ized this; it's all done via arcane command line. It is truly tedious and prone to error. This difference in GUI-ization will likely emerge as a key distinguishing factor between these products.

The GUI-ization trend is not over. Indeed, it'll be another decade before most humans who aren't programmers or system gurus can interact with most systems and software via a natural, intuitive interface. Maybe by then, some de facto standard for using the right mouse button will emerge.

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy. He can be reached at (609) 275-7311 or via the Internet at ed@mier.com.

. . . and preparing for the challenges of the next 10 years

There's something intimidating about these every-10-years anniversaries, as anyone who's ever turned 40 knows. In the networking industry, we may have a better reason to fear the next decade professionally than most of us do personally. What we do in the next 10 years will set the tone for business communications and practices long after we've all retired.

Flexibility and investment are opposites in the world of network planning, and over the last decade, we've invested about a quarter of a trillion dollars in networks. Every buck we spent was like a nail in a house frame — progress toward something specific that immediately limited our choices.

If we judge our net investment by comparing the value of the existing infrastructure with the amount of money we have to spend on new equipment and services, our flexibility to change directions will peak in 1996 and 1997. If we spend our capital dollars in these years to perpetuate our present practices, it will be almost six years before we see the financial window of change open for us again.

We think ATM is the way of the future, but so is real-time Internet. Fast Ethernet is moving to every desktop, along with ATM, ISDN and wireless LANs. Ten years from now, bandwidth will be so cheap that everybody will have video dial tone to the home, but so expensive that we will have to invent multiplexing technologies like ATM or frame relay to make more efficient use of network bandwidth.

Thomas Nolle

The point is that we cannot plan and build for all possible futures. In the past, the number of futures we could even visualize was limited. In the next 10 years, our options will continue to expand as the various roles technology can play in changing business practices become clear. While we're considering these giddy choices, our window will close and we'll have no financial choice but to stay the course.

Getting away from this ugly picture of 2006 is going to take some work. First, we have to focus more on option assessment. Most technologies are validated by an implicit connection between the technology and a given set of business practices. If two technologies don't favor the same practices, the options they present are mutually exclusive. We should make vendors and analysts present technology with clear associations to business practices so we can group those that support the same workflows and relationships. We need to pick the best future, select technologies that support it and ignore the rest.

Second, we have to pay more attention to migration planning. Everybody cites the PC revolution of 1981 as an indication of how fast technology can be deployed, but we forget that we didn't have any significant desktop investment to protect in 1981. Once you build something, the issue of migrating out of it becomes as significant as the issue of where you're migrating to.

Third, we have to stop treating technology education like it's entertainment. The real decisions that will shape our nets in the future are made by about 38,000 people out of the approximately 300,000 that actively read networking publications. Yes, we need to keep that larger number informed, but we also need to help the much smaller number of active planners move our nets forward.

Networks have gotten a lot bigger in the last decade, and they'll get bigger still in the next. Whether they'll become different as they grow bigger, whether they'll be based on new and better technology or be retreads of the old, will depend on whether we want to be entertained or challenged in our exposure to technology, and impulsive or systematic in our decisions.

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The Mating Habits of Highly Effective Routers

Cray Communications

Firewalls scale to new heights

MIKE KASUN

As hackers get around packet filters, along comes a new genre of network blockade products.

By Edwin Mier

There's a rabble of socially dysfunctional but technically talented hackers, bit-whackers and assorted cyberpunks lurking around the Internet posing a real threat to the security of your internal data network.

But there's no need to panic — not hen you can install one of a new breed of rewall products to erect a strong barrier etween your dedicated Internet link and rivate network.

This new genre of application layer rewalls operates at a higher level in the rotocol stack than older products that se just IP packet filtering techniques; ius, these new firewalls offer greater pro- ction against hack attacks.

Application layer firewalls ain more insight into the data onversations that traverse an ıternet link because they exam- ıe packets and protocols at and ove the transport layer, which ontrols the dialogue between ommunicating end nodes.

leeting a need

These new firewalls have nerged in response to an ıcreasing number of published nd unpublished accounts in hich organizations' internal etworks have been compro- ised via their Internet connec- ons.

In many cases, perpetrators licitly view or retrieve internal ata files. In others, they leave an nocuous calling card — the electronic equivalent of graffiti. In a few cases, though, the result has been wholesale destruction of files and records.

Increasingly, perpetrators have bypassed seemingly secure IP packet filtering mechanisms, which are typically implemented on a router. These packet filters decide whether to forward an IP packet based on the source or destination address found at the network layer (see story, page 78).

Now, however, you have a growing number of more secure application layer products from which to choose.

Products range from a software-only offering for Windows NT from BateTech Software, Inc. priced at less than $1,000, to bundled hardware and software packages costing $25,000 or more from vendors including ANS CO+RE Systems, Inc., Cisco Systems, Inc./Network Translation Inc., and Norman Data Defense Systems, Inc.

In virtually every case, these firewalls will need at least two network links — one to the internal protected network and one to the Internet, typically via a router.

This two-sided configuration is needed because of the way application layer firewalls work. They act as a server on one side of the link, receiving Internet user requests for connection to an internal resource, for instance. The firewall responds to those requests on behalf of the internal resource.

Once a firewall determines a particular connection can be permitted, it can then act as a client on the other side of the link, requesting connection to the target resource.

The firewall accomplishes this task by monitoring the connection setup dialogue between the communicating nodes. That dialogue is mapped to specific socket or port numbers that are temporarily assigned at the time connections are established. Most applications that run over IP employ this session-based TCP protocol at the transport layer.

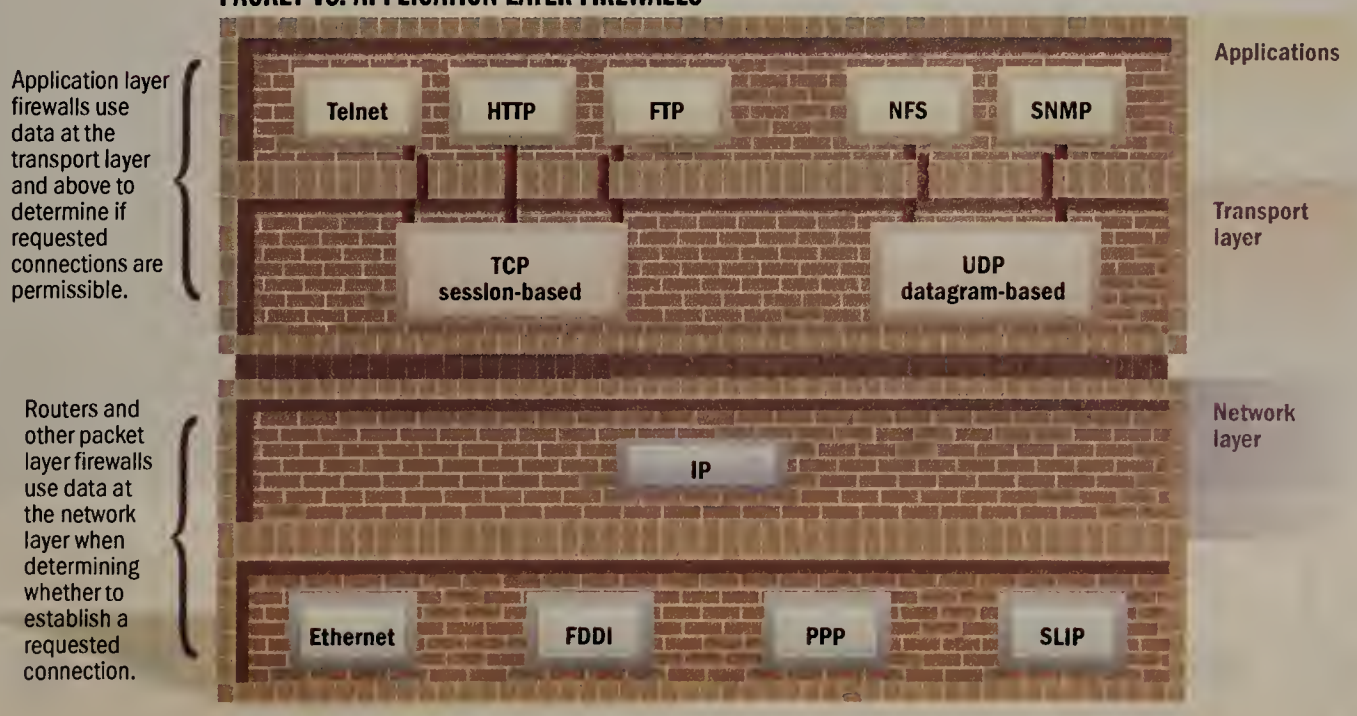
A few applications, however, such as those that use the Simple Network Management Protocol and most implementations of the Network File System, are sent over the net as unrelated datagrams in a connectionless manner. Its connectionless nature makes this traffic tougher to deal with, so you should query vendors about the firewall's ability to observe and control it.

By interspersing itself in the session setup dialogue, the firewall can better assure that unauthorized users are kept off your private network while enabling authorized users to pass through unfettered.

This client/server mode of operation is one main reason for the two-sided network configuration, but this link duality is a good idea in any event to ensure that no traffic from the secure, internal side of your network ever appears on the external, unsecured side.

The first step in selecting

PACKET VS. APPLICATION LAYER FIREWALLS



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one of these application layer firewalls is to determine whether a software-only or a packaged system best suits your needs. That decision is based on several factors, including whether you have the prerequisite platform for a software-only firewall; your staff's familiarity and expertise with the operating system a particular firewall requires; and whether you, the vendor or a third-party organization will install, configure, administer and service the firewall.

A software-only product or the software half of a bundled offering will typically run on some variant of Unix, although Windows NT-based firewalls are also now becoming available.

At least one vendor, Milkyway Networks Corp., has tweaked an implementation of Unix to produce what amounts to a proprietary operating system for its product. Milkyway, joined by Border Network Technologies, Inc. and others that have done the same thing, claim that a customized operating system makes it more difficult for hackers to crack into the firewall itself and make configuration changes.

Some software-only products, such as Border Network Technologies' BorderWare Firewall Server, require the user to provide just a bare-bones PC with an Intel Corp. 80486 or Pentium processor. Others, including firewalls from NEC Technologies, Inc. and Trusted Information Systems, Inc., also include their own customized operating system but come already installed on Pentium-based PCs.

With software-only products, you have to carefully check out hardware requirements to make sure your platform will deliver adequate performance. This is necessary because every firewall is architected differently, and processing loads generated by each will vary even with an equivalent traffic volume. This is less of a concern when you buy a bundled package, but even then you may still have to choose from among several platform performance levels.

Regardless of your staff expertise or whether you provide the hardware platform, you may want to have the firewall vendor or its reseller install and configure the product due to all of these nuances (see story, this page).

What's in a name?

With an industry that's blossomed only in the past few years — since the Internet began spreading to otherwise private networks — the firewall marketplace has coined its own vernacular. So you need to be prepared to sort through some buzzwords and terms that, it turns out, connote different things to different firewall vendors.

Consider, for example, firewall vendors' inconsistent use of the terms "application gateway" and "proxy server." Many vendors say they are the same thing and claim their firewalls can be either one. A few, however, say the two are markedly different.

Knowing the difference, and the fact that vendors freely intermingle the terms yet disagree on their meaning, can make you a smarter shopper.

As an application gateway, the firewall typically behaves as a client on the Internet and appears as a server to users on its secure, protected side. When operating in this mode, the firewall will examine specific application protocols to decide whether connections are permissible. The range of supported application protocols varies from firewall to firewall, but most examine such popular ones as telnet, the World-Wide Web's HyperText Transport Protocol (HTTP) or File Transfer Protocol (FTP).

Configured as a proxy server, the firewall interacts over the Internet on behalf of internal users, making it appear that all outgoing traffic emanates from the firewall and shielding internal node addresses from the Internet. Because a proxy server does not necessarily examine application layer information, it may be able to support a mix of application protocols.

Only two vendors — ANS CO+RE and Border Network Technologies — classify their firewalls as application gateways but not as proxy servers.

"We generally group proxy and application gateways together as software which is essentially a client and server application glued together," says E Nowak, manager of technical support f ANS CO+RE's ANS InterLock firewall.

However, Border Network Techn ogies has a different spin. "We view pro servers and application gateways as t

The softer side of firewall selection

Selecting a firewall that has the technical capabilities you want is only part of the overall purchase decision. You'll likely have a lot riding on that firewall, so you should insist that vendors give satisfactory answers to these questions before signing on the bottom line:

■ **What is included in the software maintenance program, and how much is it?** With hacker innovations being discovered regularly, you'll want to ensure the firewall vendor offers regular software updates that combat such new threats. If a monthly or quarterly software update service is available and affordable, consider it.

■ **Will the vendor install and configure the firewall?** You may have to pay extra, maybe $1,000 to $3,000, but paying a vendor-trained technician to install and configure the firewall may be well worth it. After all, these are in many cases extraordinarily complex software products, often running on proprietary operating systems. You can administer the product later, but consider letting the people who built it set it up.

■ **Who provides service?** Several prominent Internet service providers (ISP), such as BBN Planet Corp., offer ongoing maintenance and monitoring of your firewall. BBN offers this service for Trusted Information Systems, Inc.'s Gauntlet Internet Firewall, which it resells. Other ISPs likewise offer firewalls, which they usually resell, but you may be required to arrange service and software maintenance with the firewall vendor, or perhaps another third-party organization.

■ **Are references available?** You should ask for and check with user references supplied by the vendor. Look for one with lots of experience with the product, and whose topologies and configurations are similar to yours.

— Edwin Mier

Reader views on Internet firewalls

Based on 100 interviews

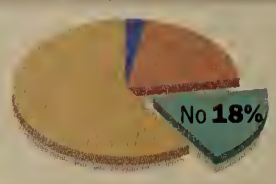
Are firewalls an effective safeguard against unauthorized access from the Internet?

"Firewalls offer reasonable precautions and enable us to put the best security practices in the industry to work."

"Ours has been tested. People have tried unsuccessfully to get in."

"I've looked into the issue to a large degree and I'm now confident firewalls can be effective. We used routers at first."

"The products I've looked at can do a number of things and can keep out perhaps 98% of intruders."



"Hackers can break into anything."

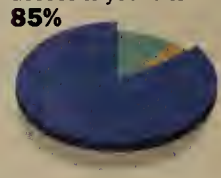
"Nothing is completely bullet-proof, and that's been demonstrated."

"I have not seen a sure way to stop someone from getting into the network if they want to."

"It depends on the complexity of the program and the skill of the person who sets it up."

What are firewalls best suited for?

Controlling outsider access to your site **85%**



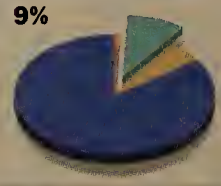
"Our company is more at risk of losing valuable data to outsiders and our philosophy is not to control what our people do internally."

"If our largest application were accessed, there could be a lot of damage. The company name would be put in the press and we would be damaged."

"We can track internal users, so we're more concerned with a breach of security from the outside."

"Employees can be fired if they abuse their access to the Internet; we have no control over outsiders."

Controlling outsider access to your site and internal access to the Internet **9%**



"First, to prevent someone from the outside from doing any damage. Second, to prevent your own people from doing something we could be responsible for."

"We want to prevent anyone from the outside from getting into our network and hacking the system, and also to constrain our own users from going out and just playing games."

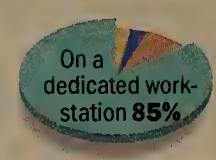
Controlling internal access to the Internet **5%**

"We've been ripped off by our own people."

"We need to control who gets out to the Internet and charge them."

Don't know **1%**

Where should you run a firewall?

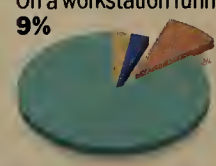


"I want to make sure the machine is only doing one thing. There is more security that way."

"A dedicated workstation provides less room for the intruder to play and less risk of a intruder getting through."

"A dedicated workstation provides the highest level of performance."

On a workstation running other Internet applications **9%**



"I want to have a consolidated platform in order to minimize administration chores and to keep overhead down."

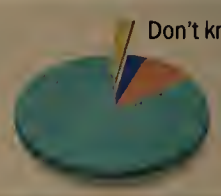
"You can secure Web applications using the firewall technology."

"It's a matter of convenience."

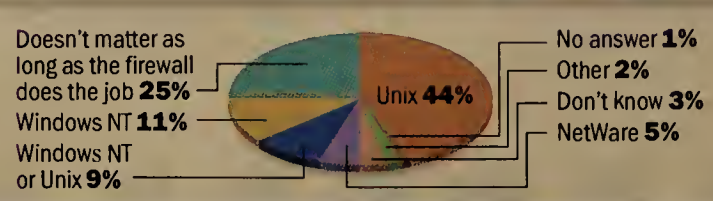
It depends **3%**

"It depends on what you want to do. But as your application and functional needs grow, you will need to split the functions off to seperate servers."

Don't know **3%**



What is your preferred firewall operating system?



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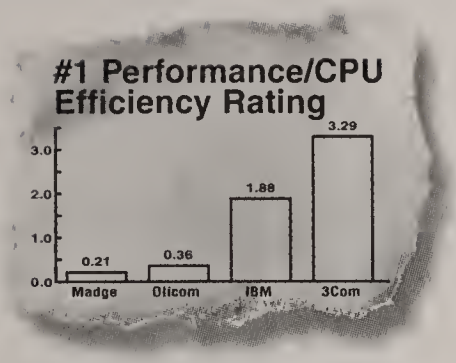

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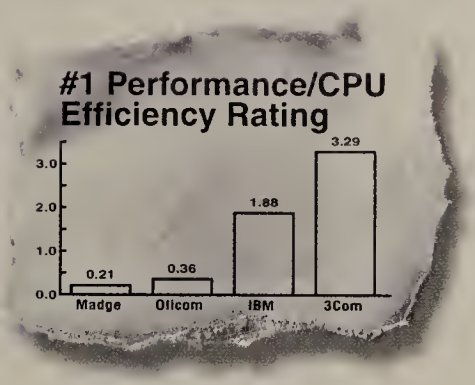

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Internet firewalls

Company	Product	Type: Software	Type: Hardware and software	Operating systems	Network interfaces	Key features: Proxy server	Applications gateway	SOCKS server	Web traffic/access control	Transport layer filtering	Network layer filtering	Address translation	Real-time notifications	Log/activity reports	Other features: DNS server	FTP server	Web server	E-mail server	Security systems	Cost: S: Software B: Hardware and software bundle
ANS CO+RE Systems, Inc. (800) 456-8267	ANS Interlock	✔	✔	Unix	Not specified		✔		✔			✔	✔	✔	✔				SecureID, SSL proxy, Enigma Logic	S: $42,000 B: $18,000-$26,000
BateTech Software, Inc. (303) 763-8333	iWay-One	✔		Windows NT	Platform dependent	✔	✔		✔			✔		✔	✔	✔			SSL server, Kerberos server, remote dial-in	S: $495-$99
Border Network Technologies, Inc. (416) 368-7157	BorderWare Firewall Server	✔		Proprietary	FDDI, token ring, Fast Ethernet, high-speed WAN		✔		✔	✔	✔	✔	✔	(1)	✔	✔	✔	✔	SSL, SecureID, CryptoCard	S: $4,000-$11,000
Checkpoint Software Technologies, Inc. (415) 562-0400	FireWall-1	✔		Unix, Windows NT	Ethernet, token ring, ATM, FDDI, WAN				✔	✔	✔	✔	✔	✔					SecureID, Bellcore S/key	S: $4,990-$18,900
Cisco Systems, Inc./ Network Translation, Inc. (415) 842-2100	Private Internet Exchange		✔	Unix	Ethernet, Fast Ethernet				✔	✔	✔	✔	(1)	(1)						B: $9,000-$40,000
Digital Equipment Corp. (800) 344-4825	Digital Firewall for Unix	✔		Unix	Ethernet, token ring	✔	✔	✔	(1)	✔	✔	✔	✔	✔	✔	✔	✔	✔	SSL server, various authentication devices	S: $10,000
Global Internet (415) 855-1703	Centri Firewall	✔		Windows NT	Platform dependent	✔	✔		✔				✔	✔	✔			✔		S: $6,000-$10,000
Harris Computer Systems Corp. (800) 666-4544	CyberGuard Firewall		✔	Custom Unix	Ethernet	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	Enigma Logic	B: $24,995
IBM (919) 254-7416	Internet Connection for Secured Network Gateway	✔	(2)	Unix	Ethernet, FDDI, token ring, WAN	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	SecureID, Digital Pathways	S: $9,999
Livermore Software Laboratories International (713) 974-3274	Portus Secure Firewall	✔	(2)	Unix	Platform dependent	✔	✔	✔				✔	✔	✔	✔		✔	✔	SSL server, SecureID, CryptoCard, Digital Pathways	S: $10,000
Milkyway Networks Corp. (613) 596-5549	Black Hole	✔	(2)	Custom Unix	Ethernet, token ring	✔	✔		✔	✔	✔	✔	✔	✔	✔			✔	SSL proxy, SecureID, Bellcore S/key, Enigma Logic, others	S: $2,900-$20,000
NEC Technologies, Inc. (800) 668-4869	PrivateNet Firewall System		✔	Custom Unix	Ethernet	✔	✔	✔	✔	(1)		✔	✔		✔				Digital Pathways	B: $14,950
Network-1 Software & Technology, Inc. (800) 638-9751	FireWall/Plus	✔	✔	DOS	Ethernet, token ring					✔	✔									S: $10,000 B: $12,800
Norman Data Defense Systems, Inc. (703) 573-8802	Norman Firewall	✔	✔	Custom	Ethernet	✔	✔		✔	✔	✔	✔		(1)			✔			S: $13,000 $19,000 B: $25,000
Quarterdeck Corp. (800) 225-8148	IWare Connect	✔		NetWare 3.X or 4.X	Platform dependent	✔	✔		✔	✔	✔	(3)		(1)						S: $10,000
Raptor Systems, Inc. (617) 487-7700	Eagle Firewall and EagleLAN	✔		Unix, Windows NT	Platform dependent	✔	✔		✔			✔	✔	✔	✔				SecureID, CryptoCard, Bellcore S/key	S: $3,500-$25,000
Secure Computing Corp. (612) 628-2700	Sidewinder	✔	✔	Unix	Ethernet	✔	✔		✔				✔	✔	✔	✔	✔	✔	SSL server, Digital Pathways, LOCKout	S: $6,900-$19,900 B: $16,900 $29,900
Sterling Commerce (800) 700-5599	Connect:Firewall	✔		Unix	Platform dependent	✔	✔	✔	✔			✔	✔		✔	✔	✔	✔	SecureID, one-time passwords	S: $8,995
Trusted Information Systems, Inc. (301) 527-9555	Gauntlet Internet Firewall	✔	✔	Unix	Platform dependent	✔	✔		✔			✔	✔	✔	✔	✔	✔		SSL proxy, SecureID, CryptoCard, Digital Pathways, others	S: $11,500 B: $15,000
V-ONE Corp. (301) 838-8900	SmartWall		✔	Unix	Ethernet, token ring, high-speed WAN	✔	✔		✔		✔	✔	✔	✔	✔				SecureID, Bellcore S/key, others	B: $20,000

Product names highlighted in color were selected for the Short List.

Chart compiled by Mier Communication

Footnotes:
(1) Limited functionality. (2) Optional. (3) Limited to address translation for NetWare IPX workstations. (4) Pricing is based on $100 per node for 100-user license. SSL = Secure Sockets Laye

discrete functions," says Andrew Flint, product manager for BorderWare Firewall Server. "Proxy servers work at the TCP level and accept pre-approved packets. Application gateways, which examine the contents of each inbound and outbound packet, are more secure."

A view of transparency

Transparency is another key point of comparison for firewalls.

For efficiency and productivity, a firewall needs to provide as much security as possible while being as transparent to authorized users as it can. This means internal users connecting to Internet resources should not experience exceptional delays in getting clearance to go through the firewall or be subjected to multiple logon sequences.

This is a tough balancing act for firewall vendors. A few require you to tweak the configuration of internal client workstations to make Internet connection smooth and efficient.

For example, you could reconfigure the client to direct applications using certain protocols such as HTTP to the firewall. Usually, clients are configured to send all packets destined for devices outside their subnet to a default gateway, which is typically the nearest router.

A few firewall vendors have addressed transparency by implementing a proposed IETF standard protocol called SOCKS, which provides transparent authentication services for clients requesting connection to devices through the firewall. SOCKS Version 5 is currently an Internet-Draft, which means it can still be modified before reaching the IETF's more final request-for-comment stage.

Otherwise, firewalls functioning as application gateways, proxy servers or application proxies will invariably employ a few proprietary twists and bend some TCP/IP rules to accomplish the joint objectives of security and transparency. These rules may involve route selection and name and address resolution, for example.

Among the more commonly implemented TCP/IP deviations is the firewall's implementation of the Domain Name Service (DNS). The protocols TCP/IP uses for routing as well as name and address resolution were designed decades ago for completely open and efficient data flow.

Firewall vendors had to modify the way names and addresses are looked up on TCP/IP nets to preclude the full disclosure of internal network users to outsiders on the Internet.

Added value

Providing security, and to a lesser degree transparency, are the main concerns of firewall vendors. However, a host of other features are also import including:

■ Address translation. Many firewalls p port this feature, which is useful for venting addresses used on the inte network from appearing on the Inte It also lets you preserve the use c addresses on the internal network v those addresses have not been for assigned for use on the Internet.

■ File or virus checking. As usefu it would seem, the only vendors l in the Buyer's Guide chart on this that check incoming files for viruses, jan horse executables, or other dast contaminants are Border Network nologies and Norman Data De Systems.

Such inspections of incoming would significantly delay the ret of information from the Internet, v is likely the reason so few fir support it. For the most part, users ar

r off relying on virus-scanning and file-
ecking applications running on an
ternal network node.

However, since data files and executa-
es that may be retrieved from the Inter-
t are usually written to disk immediately,
ntaminants may already be at work by
e time a file or program is passed to an
ternal node for checking.

Real-time notifications. You may want to
ow when the firewall identifies that a
curity violation is occurring. Firewalls
at don't provide such real-time notifica-
ns will in most cases still record all such
ents in a log.

Log/activity reports. Not all firewall
ckages come with the added applica-
ns needed to process what could
come huge volumes of log files. If you
nt to sort or filter these logs and assem-
e reports, whether to charge-back
partments for their Internet usage or
f-line analysis of security events, ask
out the firewall's report-generation
pabilities.

SNMP agent. All firewalls support local
ministrator access, but what if the
ministrator isn't near the firewall?

Some vendors don't allow remote, in-
nd access, ostensibly for security rea-
ns. They don't want to give hackers the
ance to break in and change the firewall
nfiguration. Others support limited
mote administrative access, but usually
with multilayered password and authenti-
cation precautions built-in.

However, if you have an SNMP-based management infrastructure, you may want a firewall with an SNMP agent, although the inherent security mechanisms in the widely implemented SNMP Version 1 are notably limited.

Checkpoint Software Technologies, Inc., Harris Computer Systems Corp., Livermore Software Laboratories International and Quarterdeck Corp. all have an SNMP agent.

Other servers

While acting as a barrier to keep unwanted visitors off your internal network is the firewall's primary mission, many products are now outfitted with software that enables them to also act as DNS, Web, FTP and electronic mail servers.

But many vendors, and users interviewed for *Network World's* reader views on Internet firewalls (see graphic, page 72), recommend you don't run the firewall application with other Internet servers on the same platform, mainly for security and performance reasons.

However, if you are in a small to midsize organization or a department with a limited budget or minimal traffic, you may want to consider loading one or more of these other servers on your firewall if for

NetworkWorld Short LIST

Internet firewalls

The Short List highlights products Network World *recommends you examine when shopping for an application layer firewall. The selected products are leading contenders in one of three market niches and will meet the needs of many companies. Other contenders may offer something that better suits your needs.*

Border Network Technologies, Inc.'s BorderWare Firewall Server is a prime contender if you're looking for a low-end, software-only firewall that runs on inexpensive PC hardware. Designed to run on Intel Corp. 80486- or Pentium-based PCs, the firewall can act as a basic World-Wide Web server, a File Transfer Protocol server and a newsreader server. The firewall functions at several levels, ranging from network layer filtering to an application layer gateway. It also works with various third-party security products, including Security Dynamics, Inc.'s SecureID and authentication devices from CryptoCard, Inc.

Milkyway Networks Corp.'s Black Hole can meet the needs of users requiring a low-end to mid-range firewall that operates at levels ranging from network layer filtering to an application layer gateway. Sold as software or optionally as a bundled system, the package runs on platforms with Intel or Sun Microsystems, Inc. scalable processor architecture (SPARC) processors atop a customized Unix operating system. The package also supports various third-party security products.

One of only a few established leaders in this market, **Trusted Information Systems, Inc.** offers the respected and widely deployed **Gauntlet Internet Firewall.** This mid-range to high-end firewall is sold through and serviced by various OEM and reseller channels. The product can be purchased bundled on a Pentium-based platform or as a software-only offering that can run on several leading Unix platforms. The firewall functions as an application layer gateway and proxy server, and also includes support for a broad spectrum of third-party security products.

MORE FOR YOUR MONEY

Here are some features that go beyond what's listed in the Buyer's Guide chart on page 76 and the companies that offer them.

- Dynamic Host Configuration Protocol support/BateTech Software
- E-mail gateway/Trusted Information Systems
- E-mail proxy/Norman Data Defense Systems
- Internet mail gateway/ANS CO+RE Systems
- News server/Border Network Technologies and Sterling Commerce

no other reason than cost savings.

Firewalls are also sprouting support for third-party security and authentication schemes that permit authorized users to pass through the firewall and onto the internal network. This may seem to defeat the purpose of a firewall, but such support is becoming more important as organizations increase their use of the Internet as a private backbone supplement.

Among the most popular third-part schemes are handheld authenticators which are offered by several vendors including Enigma Logic, Inc. and Secu rity Dynamics, Inc. These third-part products typically involve authentication of remote callers via the exchange o keyed passwords using a handheld calcu lator-type device.

While Internet connectivity has rise to the level of a must-have in the eye of more organizations, so, too, has th need for adequate security to protec internal networks from the dark side o the Internet.

It's been said that security an interoperability are inversely propo tional. And while there's more than a littl truth to that adage, with the advance firewall vendors have made recentl it's possible currently to protect you self to a reasonable extent without sacrifi ing much in the areas of openness an interoperability that are the Internet hallmark.

Mier is president of Mier Communicatio Inc., a network consultancy in Princeton Jun tion, N.J. He can be reached at ed@mier.com (609) 275-7311.

IP filtering: Only a first-line defense

Routers were among the first products to offer a firewall capability and they continue to do so today, typically implementing IP filtering.

While IP packet-level filtering is a good first line of defense, it's not generally regarded as adequate to deter a stubborn perpetrator of above-averag technical competence.

That's because IP packet filtering operates at a fairly low level in the over all Internet-protocol scheme of things Usually, packets bearing one of a pre-defined table of IP addresses are allowed to pass, while all others are turned away.

But it's now fairly well known that packets containing bogus IP addresse can easily be created or even hijacked (*NW*, April 1, page 1). And once some one has surreptitiously acquired a vali IP address, it's not too hard to gain pa sage through even the most elaborate set of IP address filters.

—Edwin M

We tested 10 of the 20 Internet firewalls lis In the Buyer's Guide chart on page 76. Res of those tests can be found on Network Wo Fusion. Select NetRef, Product Reviews/Bu Guide then Firewalls.

NetworkWorld Fusion
http://www.nwfusion.com

NETWORK WORLD 10-YEAR ANNIVERSARY:

Recounting the technologies of the past, reshaping the network future

10 trends that will r

By Bill Laberis

"I finally got caught up with last week. By tomorrow, I ought to be ready for yesterday."

Here's the lowdown on the forces that will shake up your job, your business and your life in the next 10 years.

You're all nodding your heads in collective agreement with this Irish saying. "Yeah, that's us, the enterprise network managers, running like greyhounds pursuing a mechanical rabbit that's always almost within reach."

It's tomorrow. It's the future. And in the IS world, dwelling on it can occupy as much time as living in the present. It has to be that way because some things change so fast that the lines between tomorrow and today can blur. It seems like only yesterday that the Internet was unknown beyond the confines of the academic and research worlds, and now it is all anyone talks about.

People like Ken Olsen were right in forecasting a decade ago that the network would, in essence, be the computer. Others bet on the demographics and profited nicely from technologies that yielded flexibility in the schedules of working Yuppies with children. So today, laptops threaten the desktop hegemony in the corporate world while remote access software and networking are booming.

Yet with other predictions, the lines between the present and future shoot off forever in parallel, never crossing. For all its hoopla, where is pen computing today? Isn't 1996 at least the seventh consecutive "Year of ISDN?" Why didn't the PC managers of 10 years ago grow up to rule the IS roost? For that matter, why hasn't the PC replaced that crotchety old mainframe, an event seen as a foregone conclusion a decade ago?

Notice the pattern?

If your focus on the future centers on individual technologies, you will likely miss the bigger picture.

Information technology is not an end unto itself (although when you are up to your knees in alligators and you're trying to jump-start the network, it may well seem that way). Rather, technology is driven by far greater forces. Global forces. Like culture. Politics. Wealth creation. Demographics.

With the de facto engines of change in mind, we've tried to crystallize — in the spirit of our 10th anniversary — the 10 issues, trends and forces that will shape your life and career most profoundly in the decade ahead. To begin, we tapped the insight of two dozen visionaries and industry veterans. We combed through their input and mixed in our own wisdom and . . . voila!

Your nods of collective agreement are more tentative. You ask: Are you guys sure about these? Where's the technology? What, no acronyms? Why does this list smell more like business than information technology?

Take recentralization of IT. The New York-based Research Board, the most prominent IS think tank in the world, found plenty of evidence of it. Of 25 very large companies studied, 20 are strengthening central coordination and control over applications development.

Ernest von Simson, the board's senior partner for research, says this is no fad. It's real. It's being driven by tremendous pressure to maximize and optimize all resources in an era of downsizing and brutal international competition.

A closely linked trend is the one that will drive IT organizations to be far flatter and more flexible in 10 years than they are today. Command and control are on their way out. Teamwork will be in, and in grand style, with multidisciplinary teams becoming the rule, where today they are the rare exception.

Business value. Business value. Business value. That's the mantra that will drive the network environment above all else in the next decade.

The greatest opportunity IS managers will have to advance their careers will not be based on whether they can make the trains run on time, so to speak. Rather, can they build networks and systems that will support radically new ways of doing business in the 21st century, namely electronic commerce and mass customization?

Before they do, they'll have to take care of what is fast becoming the buzziest and loudest of all buzzwords: the intranet. Talk about explosive growth. International Data Corp. (IDC) projects a 174% compound annual growth rate between now and the millennium in sales of intranet firewall software.

IDC also predicts 50%-plus annual growth in TCP/IP-enabled systems, up from a handful of machines a few years ago to 24 million PCs by the end

hape your network

of this year. Nearly six of 10 mid-range sites surveyed by IDC listed TCP/IP as the primary net protocol. Start your engines. The intranet superhighway will be ready for heavy traffic shortly.

Boston College Professor Mary Cronin, who has written the book (literally) on electronic commerce, says the key to success here is "once and for all, tying the entire business together with an integrated network strategy." She says IS has to get beyond its legacy as a gatekeeper and open more and more corporate data to outside access. Safely and securely. Now go figure out a way to make it happen. Geez.

Fortunately, you won't have to walk alone in this valley of the shadow of New Commerce.

Global deregulation of the telecommunications industry is destined to produce not only lower transmission costs, but also far more network services, including complete LAN and WAN management services — and longer term, a sort of one-stop shopping for secure end-to-end communications, even for international networks. Compare that to the piecemeal solutions you're forced to cobble together today. Just don't look for too many of the fruits of deregulation until the millennium.

Additionally, all signs point to significant increases in network outsourcing, not only from the newly organized and restructured telecommunications providers, but also from the usual cast of outsourcing characters. You might prefer the sound of "outtasking," which Jeff Kaplan, director of strategic marketing for International Network Services (INS) in Mountain View, Calif., defines as a kinder, gentler form of outsourcing, "much less threatening to IS." It is selective outsourcing in which the network manager can augment the department's deficiencies without throwing everyone's job, his or her own included, in jeopardy.

There will be plenty of deficiencies, no fault of yours.

For the foreseeable future, there will be very serious imbalances between your demand for discrete network talent and a much smaller supply. This skills crunch may keep you in demand but will have you running toward more outside solutions. Either the people you need in-house won't be available or they'll just be too damned expensive to hire permanently.

THE BIG TEN

1. Virtualization of everything
2. Centralization of IT
3. The flat network organization
4. The skills crunch
5. Intranets
6. Electronic commerce
7. Mass customization
8. Outsourcing
9. Big bandwidth everywhere
10. Global telecom deregulation

Do you see a big part of your job evolving toward managing these outsiders and their contracts? That's probably a clear vision. Just remember, business value, business value, business value.

Get ready to support more and more people you can't see. Yuppies and aging boomers will still be willing to put in their 10-hour days. The vendors will supply them with ever-more powerful tools for taking the essence of their office home or wherever else. And while affordable bandwidth might not explode, at least not in the next couple years, it certainly will grow by one order of magnitude after another within a few years and thereafter.

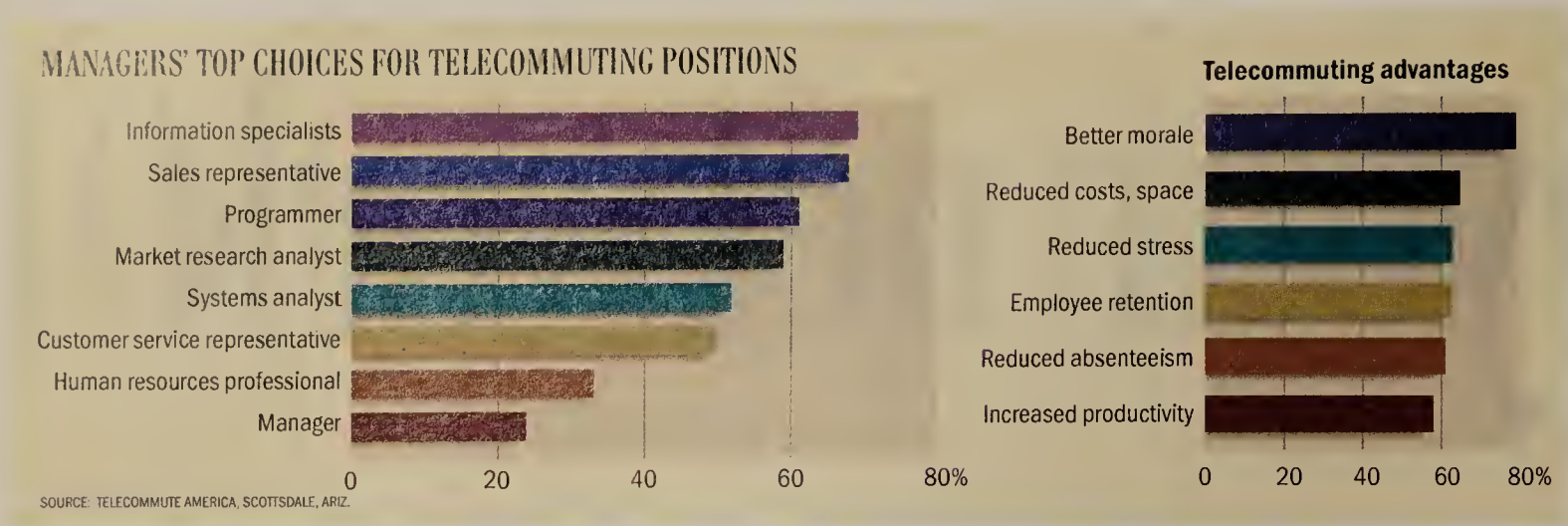
The result? Some 55 million virtual workers in need of virtual systems and network support, and that's in five years. If there's a headache to outsource, this might be the one.

Inexpensive, multimegabit bandwidth will enter the home, as well. Is it possible that the $50 billion catalog shopping industry could cease to exist when consumers can see everything in 3-D full-motion video quickly on a big, beautiful monitor? No, not possible. It is inevitable, within 10 short years, if you build the networks to support these new businesses.

Ten years out. It's not that far off. Surely you have clear memories of what you were doing in 1986, don't you?

For change junkies, the next decade will be the fix of a lifetime. Here, from an organizational, business and technology perspective, are the 10 reasons why.

PAUL JOHNSON



SOURCE: TELECOMMUTE AMERICA, SCOTTSDALE, ARIZ.

1 The virtualization of everything

The only two things you can count on in the future are death and taxes, right?

Well, take one look at the data, and the list will expand to a third item, the virtual workplace. By all indications, this virtualization phenomena will cause network professionals a gigantic virtual headache. In fact, you may end up killing yourself one way or another, which brings our list back down to the original two!

That individual employees will work out of the traditional workplace in huge numbers in the decade ahead is obvious. Gartner Group, Inc. estimates some 55 million U.S. workers will work remotely by the turn of the century.


JERRY VALENTE

"Bring the IS federation back into balance" by weaving non-IT people into IT decision making.

Paul Strassmann

The group Telecommute America polled 200 senior Fortune 1,000 managers, who displayed the predictable lust for telecommuting for the predictable reasons (save money, improve morale). But the more interesting findings were the positions senior managers felt were best choices for virtual work: Programmers and information specialists headed the list.

These same executives who are pushing virtualization have little idea how much it will cost to support the virtual network, says Mary Johnston Turner, vice president at Boston-based Northeast Consulting Resources, Inc. "The virtual worker and the virtual network present a whole new set of problems to the network manager. For starters, how do you support people you never see?"

There are enormous challenges the network manager has to face down now before virtualization spins clean out of control — problems such as huge hidden costs of problem solving; supporting disparate hardware; enormous software licensing issues; help desk issues of epic proportions; the moving target of capacity planning; and a paucity of virtual net management metrics that is likely to extend well into the future.

Overwhelming? Perhaps. But you're likely to get some help from another virtualization trend: the virtual network. New technologies are emerging in the LAN and WAN that make it easier to expand and contract the net and to support a migratory workforce.

Within a few years, telecommunications deregulation will whip up a host of new and expanded services for enterprise networks that can begin off-loading some of the virtual support chores.

"It will be as it was with frame relay," says industry veteran Ralph Ungermann, founder of Santa Clara, Calif.-based First Virtual Corp. Smaller companies such as WilTel and StrataCom, Inc. curried user favor with frame relay technology, forcing big, bad public carriers to roll out their own frame relay services to ease distributed LAN connections and make it easier to tie smaller offices into the corporate network.

"Competition will force a similar issue with ATM, which is a key to supporting the virtual environment and the video transmission it will require," Ungermann claims.

Developments such as these will make public networks act and seem private in terms of configuration and management. "Absolutely yes," Ungermann says, by the middle or toward the end of the next decade.

Advances in the WAN arena will be coupled with the advent of virtual LANs, which will make it easier to support virtual workgroups, even virtual companies, whose memberships change on the fly.

So here's free advice from the experts: Be judicious about pointing out to management the total costs of supporting each mobile worker. Explain that one way of holding down those costs is to invest during the next five years in augmenting the remote support skills of your existing staff. Make sure someone in the network organization is responsible for tracking software licensing issues. And be open-minded about the growing number of third-party support companies that are already sprouting to cater to the virtual bubble.

This won't hold back the inexorable crush of virtual workers, virtual departments and virtual networks. But you will be as prepared as you can be to deal with the problems of supporting 55 million workers, none of whom you're ever likely to see.

2 Centralization of IT

Remember George Carlin's list of the seven dirty words you couldn't say in public?

Well, things have changed, and the list has been pared down. Today, it's perfectly OK to say "centralization" anywhere, like in your IS department. Go ahead. Say it loud. You'll be hearing it a lot in the coming years, like it or not.

Centralized IT never really went away in corporate America, but its image was badly tarnished after the PC revolution. Now centralization is reasserting itself big time, thank you, in large part due to the mess created in many companies by decentralized decision making — desktops that can't communicate across disparate LANs. Incompatible mail systems that balkanize communications. Billions of dollars of personal productivity tools that haven't always boosted productivity.

If you want to see the future, look at the companies at the leading edge, companies such as Levi Strauss Co. The company threatening to reclothe corporate America in comfortable jeans is building a seamless — no pun intended — communications infrastructure to give its 11,000 employees worldwide 7x24 access to company data wherever they are on the network.

Decentralization 10 years ago gave Levi's division heads autonomy to do what was right for their departments. It also gave Levi's at least four different mail systems with a potpourri of third-party gateways between them. And Levi's has different WANs — SNA and X.25 — in different parts of its global operations.

Try to make a seamless anything out of that. Or try to get a consensus on how to bring some true standards to a situation where there are many standards, which really means no standards at all.

The answer is to centralize certain key decisions affecting common or shared IT assets, like the network. And that's what Levi's is doing.

But surely we are not going to turn the clock back 15 years or more to the days when users in the supplicating position begged before MIS tyrants!

Of course not.

Rather, corporations in the coming years will "seek to bring the IS federation back into balance," by skillfully weaving more non-IT people into IT decision making, says Paul Strassmann, adjunct professor at the U.S. Military Academy and former chief information officer of the U.S. Department of Defense.

Herein lies the best advice for network IS: What gave centralization a horrid name were IT managers who hoarded data like it was theirs and made technology decisions in the vacuum of the old glass house.

So steal a phrase from President Clinton and feel the users' pain. You have to understand their business better to explain just what you can do for them.

And promote your accomplishments, like building a unified electronic mail system. That's right, toot your own horn. There will be plenty of detractors waiting to pounce on every failed effort linked to centralized IT.

"You have to help [department heads] gain a more realistic view," says the Research Board's von Simson. "Help them to deal with technology decisions on a realistic and not an emotional basis."

3 The flat network organization

Network professionals should have little trouble coping with the organizational changes that will beset their departments in the decade ahead. After all, they've been saturation bombed by change.

Decentralization. Recentralization. Downsizing. Smartsizing. Reengineering. External outsourcing. Internal outtasking. IS as a utility. IT as a commodity.

Do they point to any unified directions ahead? Or are you condemned to another decade of organiza-

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tional fits and starts?

"The future belongs to flat, team-based and most of all, flexible IT structures, or it belongs to outsourcers," says Robert Zawacki, consultant and coauthor of *Transforming the Mature Information Technology Organization.* Zawacki has studied hundreds of companies and their IS efforts and has concluded that after a decade of preaching about uniting IS and business, most IT organizations today are still based on the now-dysfunctional command-and-control management structures of the 1950s.

Making a mosaic for the IT organization that will evolve in the next decade, Zawacki says network managers will direct teams based on function, such as LANs and WANs. The manager will also be part of project management teams, comprising senior managers from other non-IS departments.

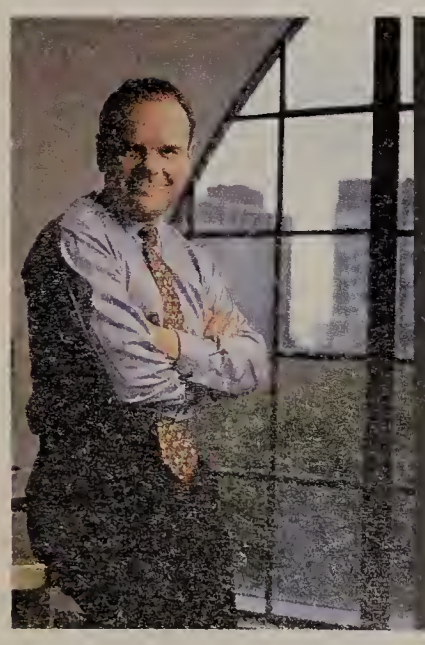
The management teams develop strategies for corporate directives such as improving cycle time. Team managers assemble a task force from their functional teams — some from IT, some from sales, some from manufacturing. Working on a time line, this virtual team, which may exist for this one project, goes about its work then disbands when it's done.

"It's a project management organization utterly unlike what we have in most companies," he says. "Managers have to start thinking of how they'll transform their organizations to conform to this model."

These views are shared by Don Tapscott, author of the best-seller *The Digital Economy* and coauthor of *Paradigm Shift.* Tapscott maintains that the products and services of the next 10 years will contain the knowledge of the consumer. How do you get that knowledge?

"Once and for all, the network architects need to smash down the walls between themselves and the business," Tapscott urges.

Start with a network architecture that allows managers to get the maximum input from the consumer, Tapscott says. Then make that network "the new infrastructure for wealth creation, not just something that carries data."



The network must be "the new infrastructure for wealth creation, not just something that carries data."

Don Tapscott

There's plenty more that IS can and should do to move from the command-and-control '50s to team based, business-centric structures of the 21st century.

Begin by linking the future of your immediate department to improvements in its ability to serve the business units. As the IS manager, create an actual vision statement, a manifesto for change linked to business process improvement. Literally. In writing. Developed in a bottom-up fashion with the entire IT team, not dictated down from the management gods.

Create a bureaucracy-bashing team. Seriously. Zawacki maintains that if you give a volunteer group authority to question every meeting, report and project sign-off group members can find, you'll see results that favor the team-based, flat organizational structure within months.

The network organization won't be trusted externally unless its members trust the corporation first. Then the IT group can really and truly begin to achieve alignment with the business. That, notes Tapscott, is the mother of all missions for network professionals in the coming decade, and the team-based organizational structure is the tool of choice for achieving it.

4 The skills crunch

The Graduate, 1996. Act II, Scene III. Poolside. Prescient neighbor to Ben Jr.: "Ben, I have just one word for you: Router-based multiprotocol data network development."

So it's more than just one word. But whether it's C++ programmers, Webmasters, TCP/IP specialists or router-based multiprotocol data net developers, the die is cast deep into the foreseeable future. Technology is changing far more quickly than the ability of the workforce to implement and maintain it, and the result will be a long-lived skills crunch of epic proportions.

All of which means that for most IS professionals, particularly network professionals with the gumption to blend techno-acumen with common sense about their company's business, the next 10 years will serve up unprecedented opportunities for career advancement. "It's an absolute sellers' market, and I see no end in sight," says Jeffrey Christian, chief executive officer of Christian & Timbers, an IT executive search firm in Cleveland. "For networking professionals, it's going to be very hot."

But the heat may burn you. If you're managing a network department, you'll be scrounging around for scarce, yet affordable, talent while trying to hang on to your good people. That could have some interesting side effects. One manager at Kraft General Foods will pay bonuses to IS workers who remain with the company for a designated period of time after receiving advanced systems training. But if they jump ship before, they must pay Kraft for the training.

Managers will also deal increasingly with bitter resentment from veteran workers as the twenty-somethings half their age roll into the workplace commanding far larger salaries for their scarce abilities. Hotshot network professionals with advanced switching skills will command double the salary of veteran PBX jockeys.

"Create opportunities for individuals from both camps to work together," advises Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C. "Then encourage the veterans to get retraining. Lead them to water. It's about all you can do."

If you think you will get by on your good looks and technology skills alone, you are wrong. Experts say pure technology savvy will land you safe-haven employment for only as long as your skills match the technology du jour. With technology changing in ever-shortening cycles, you must do something that very few of you have done before: You must manage your career.

"Most network professionals have never recognized a need to take control of their careers," claims Frank Schoff, whose Cedar Mountain, N.C.-based Management Recruiters firm specializes in network recruiting. "Over the next 10 years, career management for the network professional will mean constant training and retraining. And remember, the market wants managers who can implement business solutions. You can't do that if you don't understand the business."

Sitting back solely on your technology laurels will expose you to a distinct danger that lurks just over the horizon. If that is all you offer, it will look increasingly attractive to replace you with offshore technical talent. It is already happening, in fact. Companies such as General Electric Co., The Dun & Bradstreet Corp., Caterpillar, Inc. and scores of others have already taken advantage of the relatively inexpensive yet highly skilled labor pool in India, Ireland and Eastern Europe.

A network applications developer with five years' experience at an Indian job shop earns $10,000 at most. In the metro New York area, that same developer would earn about $65,000.

For now, offshore developers largely fill gaps when there just aren't enough workers to go around, as opposed to replacing many U.S. workers. But in the future?

"The network manager has to evolve into far more of a business partner for the departments they work in," urges Thomas Nolle, president of CIMI Corp., a Voorhees, N.J.-based consultancy. Nolle claims that the same skills crunch that will create superb job opportunities in the near future will also push companies to other solutions, including outsourcing and offshore development talent.

"In times of change, technical people become their own worst enemy," Nolle observes. "Things are great now, but if you don't want to be replaced in the future, you better be ready to recognize that technology and business requirements are changing very rapidly. Change with it or you are gone."

Robert Wysocki, who has written several books on IT management, puts it this way: "Jobs are out, careers are in." Wysocki says that tomorrow's enterprise will place heavier emphasis on cross-functional teams requiring such skills as negotiating, consensus building and business creativity. For the network professional, these attributes have been nice to have if you happen to have them, but not requirements in most cases.

"Either begin to change your approach to work and career planning or your dreams of job security and career growth will simply become nightmares," Wysocki warns.

5 Intranets

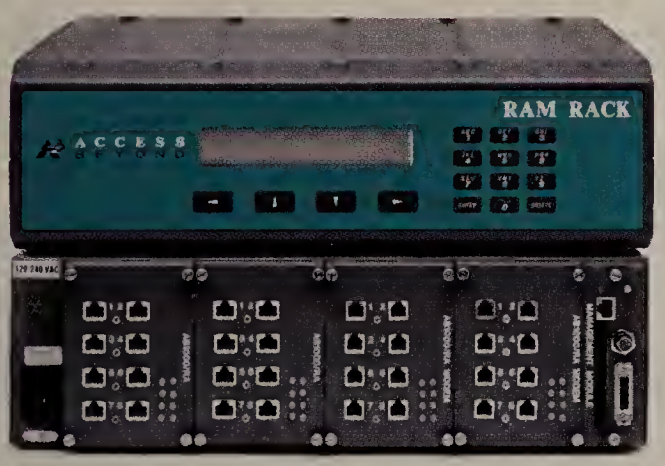
That IS managers will spend prodigious chunks of time building private Internets — or intranets — in the next five years is a foregone conclusion. AT&T's dumping of its Network Notes service, following its own experience with a 66-server intranet project, shows just how potently seductive is the intranet siren song.

Moreover, IS managers clearly see intranet activity as the first phase in the development of broader electronic commerce that will proliferate in the second half of the next decade. Intranet development is like a form of insurance against getting shut out of the world of electronic commerce, a chance to take the lead role in that mission-critical application of the 21st century.

Sounds so rosy — maybe too rosy. Can you deliver intranet applications that really deliver business value, or will the intranet become yet another in a long line of technology sinkholes?

Make no mistake, the ball is in the IS court on this one. Forrester Research, Inc. in Cambridge, Mass., found in the majority of more than 200 companies it

Before You Break The Bank On A Less Powerful Dial-In Remote Access Combination, We Offer Two Little Words...



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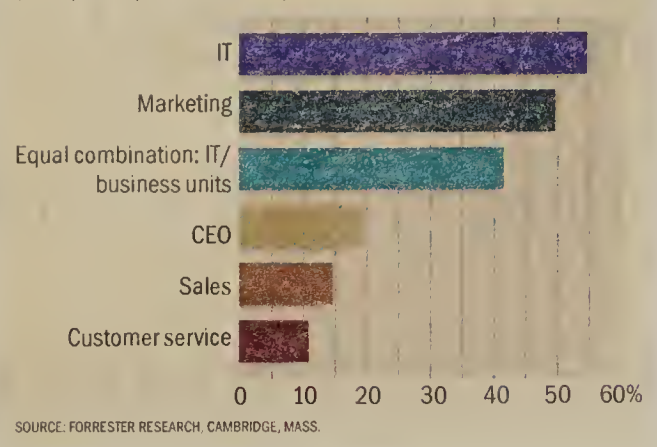
WHO'S IN CHARGE?

Who at your company is championing the use of the Internet?
(multiple responses allowed)



SOURCE: FORRESTER RESEARCH, CAMBRIDGE, MASS.

surveyed that IT was the champion of Internet use, with marketing a close second. So stand and deliver. But deliver what?

Start with a rigid application of the KISS theory (keep it simple, stupid). Experts advise IS intranet architects to start with easy applications that demonstrate the power of intranets to the greatest number of people. Things such as intranet-enabled electronic forms or simple audio feeds with messages from corporate muckety-mucks.

Lockheed Martin Corp. lets 40,000 employees read company news and ask questions about the news. At US WEST, Inc. managers get very current weather information to see if any storms threaten service in the Midwest. Simple stuff for the masses.

Unfortunately, the business press is gushing with hype about the intranet, making it sound as though every company can quickly build industrial-strength intranet applications — like at Federal Express Corp., where customers can track their own packages.

"The hype is astronomical and is pushed by investment companies who will dump millions into anything with the intranet/Internet label on it," laments First Virtual's Ungermann.

MARTIN SIMON/SABA

The Internet is "functionally capable of supporting commerce but needs to be seriously augmented in terms of speed and security."

Vinton Cerf

Be right upfront about network security in this nascent environment, experts warn. Start with candor. Tell users that intranet security rivaling that of proprietary networks is probably an end-of-century event. By then, according to 3Com Corp. founder and Ethernet inventor Robert Metcalfe, you will have some consensus on security standards and, thus, have truly secure transactions, intercompany or intracompany.

Take the lead as well in carefully articulating the cost/benefit of intranet applications, at least as they compare with proprietary solutions such as Lotus Notes or Microsoft Exchange.

For many intranet applications, marginal costs can be fractional because net managers will simply leverage two decades' worth of Internet development, which is essentially free to everyone. Huge companies such as EDS Corp. are already making plans to use Web browsers to tap into legacy data.

And last we checked, Netscape's Navigator was a pretty cheap front end.

6 Electronic commerce

For the British navy, it was Trafalgar. For amateur sports, it was the U.S. Olympic hockey team's victory over Team USSR. For Wile E. Coyote, it was the realization that that really was a train coming at him.

Defining moments, dubious and otherwise, throughout history.

For network managers, electronic commerce provides just such a defining moment. Why? Because electronic commerce offers network managers one of those once-in-career opportunities to break out of an esoteric world defined by technology far beyond the understanding of most mortals and unite their efforts once and for all with the broader goals of the business enterprise.

"This will be the chance for network managers to really get the businesspeople to see what is feasible ... to get them to commit resources to business applications that make sense," maintains Stan Leapeak, project director at the META Group, Inc., a Stamford, Conn.-based consultancy. "They must take the lead role — now, today — in pointing out the shortcomings of doing business on the 'Net while at the same time offering a blueprint for the future."

Leapeak says this kind of leadership may be beyond some network managers, whose efforts to gain control of 'Net commerce development will come up against the marketing machines of companies such as EDS and AT&T, which will offer packaged services and consulting directly to marketing and sales departments.

Leapeak's advice? Beat 'em to the punch. "Develop consulting partnerships of your own where you have weaknesses. Then develop a position paper for executive management that clearly defines the challenges and returns of 'Net commerce."

That paper should emphasize development of business-to-business commerce first and foremost. Business-to-business electronic commerce is just an iteration of the familiar electronic data interchange efforts of the past 15 years — a sort of EDI for the masses. The rollout of products designed to port EDI applications to the 'Net has begun modestly but will pick up lots of steam through 1998.

But be careful. "Face it, the 'Net is an insecure place," asserts BC Professor Cronin, author of *The Internet Strategy Handbook*. "The first thing you have to guarantee is that your connection to the 'Net is secure, just like with any other application."

In general, experts and research think tanks are cautiously optimistic that many billions of dollars' worth of goods and services will be traded over the 'Net by the year 2000. The overwhelming piece of that trade is business to business, not consumer trade. That happens when PCs and TVs merge or when pigs fly, whichever comes first.

Some have questioned whether the 'Net is even capable of sustaining transaction-intensive commercial applications. But if there's anyone who knows if the Internet can support serious levels of electronic commerce, it's Vinton Cerf. After all, he birthed the 'Net 20 years ago.

"Well ... it's functionally capable of supporting commerce," posits Cerf, who today is MCI's senior vice president of architecture. "But first it will need to be seriously augmented in terms of speed and security."

Cerf advises network managers to get real busy building "very high quality end-to-end security systems that clearly identify the trading partners," while echoing the sentiment that "intercorporate exchanges will be the most immediate use" of the 'Net for some time to come.

As it turns out, you may get a short breather from the crush of 'Net commerce hype. IDC says a combination of lousy, first-generation Web pages and the meteoric growth in the sheer number of them will cause a backlash in Internet commerce as user frustration with Web constipation grows.

What better time, though, to begin the hard work of defining and building the infrastructure to support the electronic mall and securing a big part of your future at the same time.

RAMPING UP INTERNET/INTRANET USAGE

	1995	1996	1997	1998
PCs with IP	11,300,000	18,650,000	24,230,000	32,600,000
On-line services*	8,248,000	12,647,000	19,948,700	36,250,600
Workstation (Unix and NT) seats	4,640,000	6,670,700	8,990,000	11,960,800
Total Web browser-capable seats	**19,816,800**	**32,410,000**	**45,590,841**	**69,900,000**
Total Internet-capable seats**	**24,188,000**	**37,970,000**	**53,170,000**	**80,800,200**

*On-line service customers with at least a 14.4K-byte connection.
**Some Internet-capable seats do not qualify as Web browser-capable due to bandwidth limitations.

INTERNET/INTRANET MARKETS (IN MILLIONS)

Product category	1995	1996	1997	1998
Server connectivity	$1,351.4	$2,364.9	$3,783.8	$5,675.7
On-line services	$1,682.6	$2,883.6	$5,027.2	$9,570.2
Hardware	$642.1	$1,451.5	$2,979.4	$5,151.5
Communication hardware	$219.5	$521.8	$1,107.1	$1,946.3
Server software*	$236.0	$635.8	$1,449.1	$2,633.9
Browsers	$48.7	$68.3	$95.5	$133.7
Authoring	$13.5	$46.9	$134.9	$287.5
Retrieval	$43.5	$82.0	$156.9	$245.6
Other services (consulting, etc.)	$579.6	$1,512.0	$3,271.8	$5,987.9
Total market size	**$4,816.8**	**$9,566.7**	**$18,005.5**	**$31,632.3**

*Includes HTTP, communications management and other software.

SOURCE: ZONA RESEARCH, REDWOOD CITY, CALIF

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7 Mass customization

What Henry Ford hath made, let every man and woman put asunder.

That might well be the rallying cry for network IS pressed into service in the ultimate business crusade of the next 10 years — mass customization. Custom-making products and services, often commodities, for thousands of individual customers and doing so profitably. Groceries, Windows, thermal valves, blue jeans and bank services — just about everything that for decades has been produced with the efficiencies of Mr. Ford's mass production model at heart.

Network managers working as closely as they ever have with business executives must build a new set of relationships with individual customers, each one of them. And you thought the care and feeding of internal users was a challenge.

"The key to mass customization is the network people," said Christopher Hart, president of The Spire Group, a Brookline, Mass.-based consulting firm. "They provide the glue to make it all work."

Network IS people "need to get oriented toward mass customization before the rest of the company," said B. Joseph Pine, author of *Mass Customization: The New Frontier in Business Competition* and founder of Strategic Horizons LLP, a management consultancy in Cleveland. "Otherwise, IT will be a bottleneck instead of a lynchpin."

The Ritz-Carlton chain of luxury hotels provides a good look at your future. Senior management decided to personalize its premium-priced hotel services. All Ritz hotels gathered information on guests, determining preferences in everything from pillows to views. IS then built databases that "learned over time what people like," Hart said.

"Remember, this isn't data mining, which is the search for similarities among huge numbers of people," Hart says. "The job for IS is to build nets and systems that search for differences among individuals."

So first you must engineer the network to allow customers by the boatload to cough up their product preferences through their purchases, via kiosks, over the phone, and through on-line services and E-mail. That's the easy part.

Claims Pine, "You'll need to build far more flexible nets, shared databases, seamless links to manufacturing systems. Your technology in the coming decade must dialogue with the individual customer, ascertain needs, then tie back effortlessly to the production process and downstream to your suppliers." Like EDI on steroids, extended down to the individual customer.

Flexible databases, flexible networks, flexible CAD/CAM systems. Is there anything else mass production will require of the IS community?

Said the net administrator at a building products manufacturer, who spoke under condition of anonymity, "If our experience is any indication, mass customization was the product of a complete cultural change here. The IS people saw only problems and headaches. The managers said, 'We're going to do it because we have to.' A lot of our people didn't survive."

If you have any doubts that mass customization will take hold, you have only to look at Peapod LLP. of Evanston, Ill. Peapod has brought mass customization to one of the lowest margin businesses around — the grocery business — and provides both custom grocery orders and customized grocery benefits (like customized coupon programs) for thousands of customers.

Said Peapod's IT head and cofounder, Thomas Parkinson, "This took a lot of database and a lot of networking. We capture tons of data, and our computer and network people created systems that sort it all out and make business sense out of it. I guess you'd say that's the way of the future."

So it is. And when it comes to that future, you can choose to lead the mass customization effort or get steamrolled along the way.

8 Outsourcing

In March, some 200,000 General Motors workers sat idle on their thumbs because of a strike designed to save the jobs of 100 fellow workers. The threat to the jobs of the GM 100: Outsourcing. Not IT outsourcing, mind you, but the outsourcing of parts manufacturing.

In an era where every nickel of efficiency must be squeezed from operations, outsourcing has become an accepted way of doing business across the enterprise. And that's one of many reasons why outsourcing of IT will grow — if not explode — well into the foreseeable future.

Is outsourcing a threat or a blessing in disguise?

Dzubeck says outsourcing won't be a problem for network managers. "They just won't exist."

He's only half kidding. The net manager's job may not go away when the outsourcer comes to stay. But the job as we know it may be radically altered — not necessarily for the worse.

Increasingly, today's net managers will find themselves sliding into staff positions where much of their time is spent managing outsource contracts.

Alan Paller, director of research at the Data Warehousing Institute in Bethesda, Md., notes that this has already happened in major agencies and bureaus of the federal government, where outsourcing has been king for some time now. "All the good people left standing are managing the outsiders."

They could take a heap of managing, too. In a broad *Computerworld* survey of customers of the 25 largest integrators, some of the very biggest outsourcers — such as Computer Sciences Corp., Andersen Consulting and EDS — finished at the very bottom of the list in overall customer satisfaction.

On the plus side: Outsourcing can free you from the mundane, low-value chores to attack the high-visibility, networking-based opportunities of the coming decade, like driving your company's electronic commerce and mass customization projects.

Some good advice: Make outsourcing work for you. Jump on it, and become an integral part of your company's dealings with outsourcers, making sure to write "very skillful contracts with specific quality measurements and a very specific exit clause," says DuWayne Peterson, who managed huge outsourcing contracts while chief information officer at Merrill Lynch & Company, Inc. Peterson is now president of DuWayne Peterson and Associates in Pasadena, Calif.

Try to guide your company toward the less risky waters of "outtasking," a sort of try-before-you-buy version of selective outsourcing. INS' Kaplan coined the phrase, which refers to farming out discrete tasks, like first-tier network help desk activities, rather than the entire network enchilada. That way you get to know the outsourcer and also get comfortable with the job of managing the outsource contract.

Finally, you must wage the mother of all battles in convincing management not to gut the internal network staff even in cases of total network outsourcing. Because, as Peterson notes, "some day, your company just might want to go and take the whole thing back from the outsourcers."

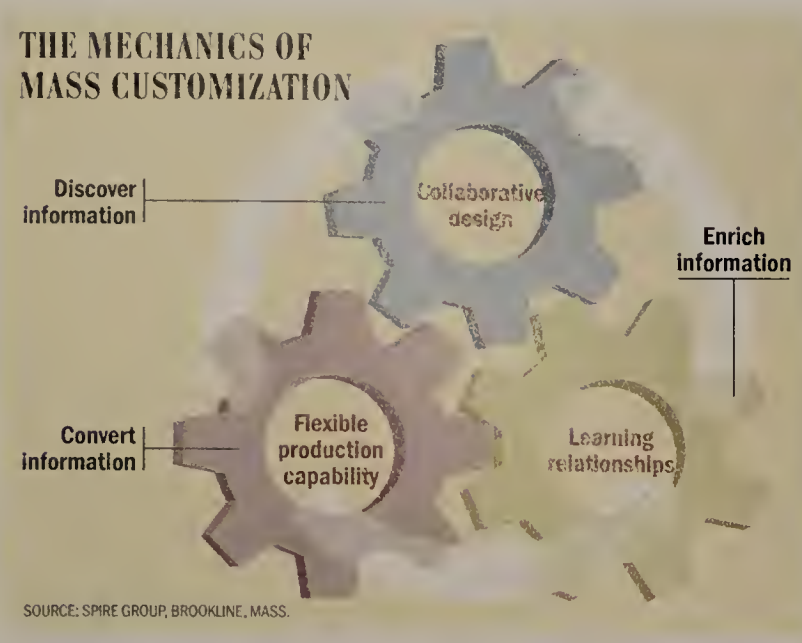
BIG GROWTH IN OUTSOURCING

U.S. and worldwide outsourcing revenue
(in millions)

	1995	2000	CAGR (%) 1995-2000
Worldwide	$76,504	$121,933	9.8
U.S.	$36,433	$59,315	10.2

SOURCE: IDC, FRAMINGHAM, MASS.

THE MECHANICS OF MASS CUSTOMIZATION



SOURCE: SPIRE GROUP, BROOKLINE, MASS.

9 Big bandwidth everywhere

In Coleridge's "The Rime of the Ancient Mariner," a thirst-crazed, shipwrecked soul is hopelessly adrift on water he can't drink. Not to worry, because development of cheaper desalinization is said to be right around the corner.

So it shall be for business and home users when it comes to bandwidth. They are today surrounded by cables and wires and invisible networks with incredible capacity, but they can't tap into them. Despite all the hype about fat pipes to every desktop or set-top, a lot of work remains to quench the thirst for bandwidth.

"Everyone's talking Java these days, but to do Java, you'll need ISDN times 10," quips Dzubeck.

But while it's unlikely that bandwidth demand will ever be completely satiated, the next decade will see the establishment of high-capacity links to many, many more remote offices, home offices, and even to mobile workers. When that happens, watch out. "Try managing your LANs and WANs once users get a taste of video," Dzubeck warns.

Managing user expectations when bandwidth is plentiful could become a major preoccupation for network managers. "The applications have to have some clear business value," notes Marvin Chartoff, national director of Ernst and Young's Network Consulting Services group in Vienna, Va.

In fact, Chartoff and others sense that managing users and their lust for ever-fatter applications will eclipse the nuts and bolts challenges of managing the data itself.

How will this take shape? Well, from now until the end of the century, network managers will see the greatest boost to affordable bandwidth from good old twisted-pair copper wire, not from fiber. Certainly not from the existing cable system. And for some very pedestrian reasons.

As MCI's Cerf points out, the anticipated merger activity among telecommunications vendors will drain away capital needed to overhaul communications

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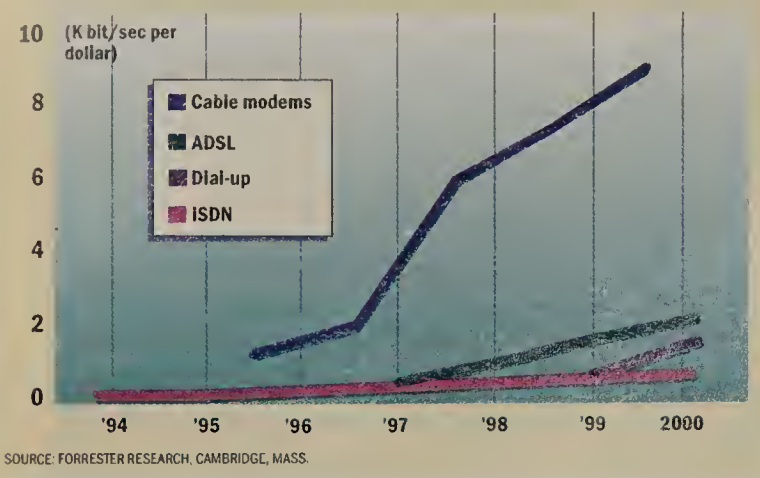

SOURCE: FORRESTER RESEARCH, CAMBRIDGE, MASS.

backbones. The cable companies, experts point out, are largely debt-ridden and woefully short of the network professionals they'd need to upgrade their systems. Cable modem makers are beset by at least four different modem "standards."

So for the first half of the next decade, network managers will work from familiar turf as they seek to satisfy bandwidth gluttony on their LANs and WANs. Advances in nascent technologies such as Asymmetrical Digital Subscriber Line (ADSL) and its companion VDSL technology should occupy far more of your attention as the big telephone companies wring every bit of speed out of their huge copper-based nets.

The experience gained in the copper world with advanced wide-area technologies such as frame relay and ATM "are about the best thing the network manager can have going into the 21st century," Dzubeck claims.

Eventually, with the consensus opinion pointing to 2001 and beyond, cheap multimegabit bandwidth to your users and to the home will be the norm. It will be delivered via the cable system, through fiber and through rejeuvenated twisted pairs of copper wire. And with it will come huge opportunities for network IS to build value-creating applications that could change the face of such businesses as retail, software distribution and financial services.

While the specific applications areas are yet to unfold, Cerf's vision of insatiable user appetite for video applications should drive network managers to begin immediately upgrading their understanding of compression technology.

Similarly, there is a ticking time bomb of storage management that will be ushered in by the challenge of managing gigantic video files and other complex data types across the network.

10 Global telecom deregulation

Man your battle stations! Fresh from their epic victory with government regulators in the U.S., the top players in the nation-sized telecommunications industry will embark on a prolonged crusade to win the hearts and minds of network managers with a dizzying array of hype, new services, pricing schemes, hype, more choices and more hype.

While there was general euphoria in the user community when the telecommunications deregulation act was passed in February, experts say that tangible benefits to corporate users might not appear for several years.

But appear they will. Initially, they will come — predictably — as lower broadband prices. Ultimately, a merged and purged telecommunications industry worldwide will present network managers with buy vs. build, "we do it vs. you do it" choices that will be both tantalizing and agonizing.

"First, we'll need to pass the Demonopolization Act of 1997," Metcalfe jokes. "Until we really demonopolize the local loops, we might not see all that much [from deregulation]." As far as any proliferation of services in the near term, Metcalfe quips, "We'll see an explosion of services like we saw an explosion of ISDN. It will occur if and only if there is competition."

Still experts do agree on some likely manifestations of deregulation and, from that, offer plenty of advice to network managers on how to respond in coming years.

"I'm usually an optimist on deregulation, but this might produce changes for [network managers] that are more evolutionary than revolutionary," Peterson said. In fact, in the short term, Peterson says, mergers could result in layoffs that could actually reduce support, something he cautioned network managers to watch carefully.

Post-millennium in the U.S., mergers will get net managers back to the good old days of end-to-end services from a single provider. Before then, within two or three years, you'll be able to tap the single-source vein for affordable broadband data services, local and long distance.

That could translate into big differences in your job as the focus shifts to one of managing outside resources, rather than providing them internally.

The prospect of handing over your WAN challenges — from voice and data to Internet access and video — to a single supplier or global consortium is tantalizing. But the reality is that telecom reform will happen in fits and starts around the globe, creating pockets of opportunity and challenge.

Internationally, in Europe in particular, deregulators will get a boost by observing the progress and pitfalls of the U.S. experience. However, the dream of "one-stop shopping for international services will take a long, long time to mature," said Daniel Briere, president of the TeleChoice, Inc. telecommunications consulting company based in Verona, N.J. "Even after the millennium, you'll still have different standards and different equipment and different cultures to deal with abroad."

Thus, you'll need to hang on to your network of people and consultants abroad to navigate what Briere says will be anything but standards for tariffs and, more importantly, services. "Be very cautious of claims of one-stop shopping for international services," he warns, looking out past the century mark. "It will be just what you want to hear, but it won't be real."

So ignore the sound and fury of hype as the telecommunications industry reorders itself in the next couple years. As the decade plays out, choices for buying corporate data services will multiply rabbit-style. And beware the long-term contract, no matter how good it sounds.

The upshot

Ask senior executives from both the user and vendor communities a simple question: "What's the toughest thing to do in your job?"

Almost without fail, the reply comes. "Managing change. People hate to change, and we're in an environment where change is constant. Only the pace of it gets quicker." People tend to reject new ideas that are in any way contrary to the technologies or business methodologies that got them or their company to where it is. They reject the future almost instinctively. It arrives anyway. And these people are steamrolled beneath it.

The next 10 years will usher in profound changes to every aspect of your work. The confluence of the trends listed above will yield unparalleled opportunities for network IS managers, but only if they can fight that human frailty to reject change.

The future belongs to the optimist and the doer, as in this quote from Robert Kennedy: "Some look at things as they are and ask why. I choose to look at things that never were and ask why not."

Laberis was editor in chief of Computerworld *for 10 years. He recently formed Holliston, Mass.-based Bill Laberis Associates, a media consulting and publishing company. He can be reached via the Internet at bill@laberis.com.*

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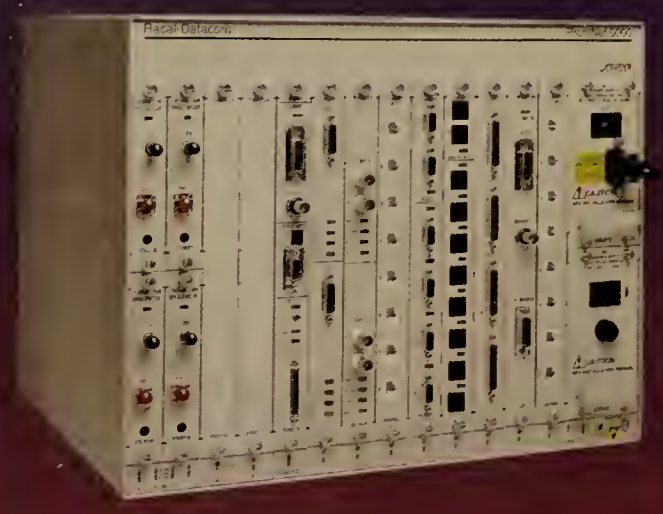

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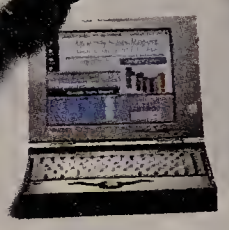
HUB MODULES

REMOTE PC



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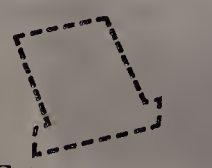

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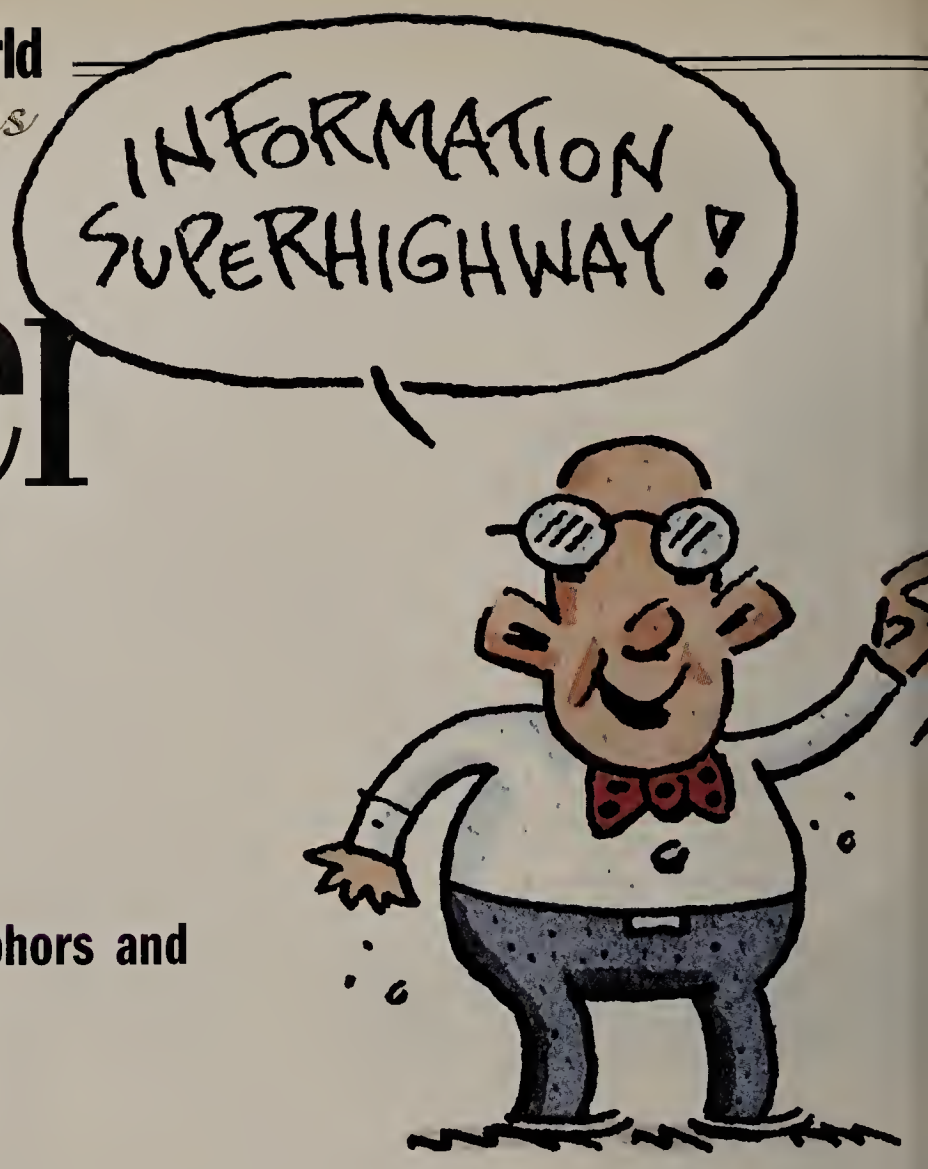
Things better left unsaid



Verbicized nouns, punctured participles, mangled metaphors and other linguistic horrors we wish would disappear.

By Kevin Fogarty

There's something about the network business that brings out the worst language in people.

It's not that we techies are particularly foul-mouthed — it's just that we morph and mutilate the language in ways that would make any word-lover blanch.

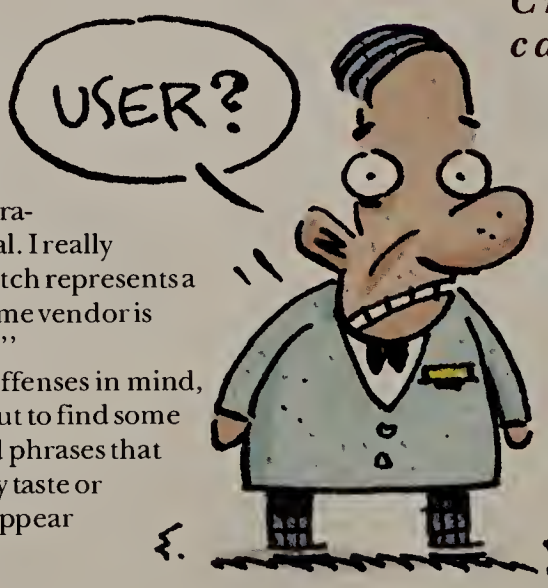
So many fully distributed, completely open, seamlessly integrated, industry-standard, multiplatform, object-oriented, mission-critical, heterogeneous, next-generation, customer-driven solutions have been introduced that it's sometimes hard to figure out what anyone is actually announcing.

"People just misuse the language," says Jamie Lewis, an analyst at The Burton Group, Inc. in Midvale, Utah. "In a business as technical as ours, you would expect language to be precise; but it's actually less precise [than nontechnical language]. The more technical you get, the less precision."

Also, words with large meanings have been applied to small things so often that it's difficult for anyone to measure the rhetoric against the product being described, says Mark Gibbs, president of the Gibbs & Co. consultancy.

"Look at 'paradigm shift.' That actually means a change in the model for looking at something," Gibbs says. "The Laws of Thermodynamics are a paradigm. It's that fundamental. I really don't think a new ATM switch represents a paradigm shift because some vendor is changing the casing color."

With those and other offenses in mind, *Network World* staffers set out to find some of the words, practices and phrases that should really, if there is any taste or restraint in the world, disappear within the next 10 years.



User:

This one seems hard to assail, but think about it: Only two major industries commonly refer to customers as users, and the other one's illegal. 'nuff said.

Solution:

Fine, an integrated set of technologies that solves a complex business problem is better than a menu of products that a net manager has to string together. Still, not every product is a solution. Some are new problems.

Best of Breed:

The term is used mostly by American Kennel Club judges. If a vendor tells you a product is Best of Breed, ask why it's such a dog.

Bleeding edge:

Overused and mostly inaccurate. Besides, the imagery's really gross.

Cyberspace/information superhighway:

These are so widely despised that even saying you hate them is a cliche. Their only use is in helping identify n bies, but even that will go away as the .aol'ers catch on

Creative capitalization:

NetFRAME. NetWare. OpenView. OK, a grammar thing, but can't any compa in this industry create a name that would pass a sixth-grade spelling te without points off for capitalizatior

Paradigm shift:

If the paradigm shifted as often as ma keters say it does, the structure of th computer industry would look like downtown Los Angeles the day afte The Big One.

Goofy titles:

The cool, nonconformist Sili Valley habit of creating offbeat job titles like technical guru product evangelist has just spread way too far. Isn't a one a product manager anymore?

Environment:

What has the hole in the ozone layer done to your ne work lately? They're operating systems, not worlds u themselves.

Fully open, object-oriented industry-standard, seamlessly integrated, client/server and buzzwords ad infinitum:

We know; we snuck in a few extra, but we hate them all for the same reason — they don't mean anything. Actually, they mean something different to everyone who uses them, which is almost the same thing.

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What's in store fo Networkin

ExecutiveBriefing

Steven
Lamb
Chairman and
Border Netw
Technologies,

Craig Benson
Chairman/COO
Cabletron Systems, Inc.

Extremely fast, reliable and easy to use. The growth of intranets underscores the migration to a predictable, utility-like service where end users can call up the information they require, including voice and video, yet still be held accountable for usage. Control will be distributed as business becomes more involved in network utlitization. Productivity increases, operating costs decrease.

Tarcisio Pedrotti
President
Distinct Corporation

Distinct Corporation was the first company to provide Internet and TCP/IP development toolkits to Windows developers. Today Distinct is the world leader in this field with toolkits for all the popular development environments for Windows, Windows 95 and NT. Distinct complements this position by providing solid, configurable solutions for the corporate intranet.

Eric Cooper
Chairman and CEO
FORE Systems, Inc.

In the workplace, in the home, and in every part of society, computers play an increasingly important role. Networking these computers together using a common infrastructure will give rise to applications that are quite simply unimaginable today. ATM is playing a crucial role in this networked world, now and into the next millennium. As computing power continues to increase at a geometric rate, ATM to the desktop and home will become the norm, enabling the global exchange of information in ways that will literally change our lives.

J.
Ada
Sr. VP Sales
Humm
Comi

F. Joseph Reid
President and COO
Alcatel Data Networks

The convergence of telephony, television, computing, and the Internet will shape the commerce and culture of the next millennium. We predict the path to the future broadband network will be one of *evolution* rather than *revolution*. Alcatel Data Networks is at the forefront of the next generation of multimedia switched networks , offering the Frame Relay and ATM products needed to propel you into the exciting world of telecommunications in the next millennium.

Rick Tinsley
VP & General Manager
Newbridge Networks, Inc.

Networking will continue its emergence as a ubiquitous utility, combining voice, video, image and data functionality. Conventional network design and services will be surpassed by logical connections and virtual networks. Change will continue at an exponential rate, although most planners think linearly. Forward-thinkers will be highly rewarded.

Internet will enable electronic
merce. Borders between
networks will disappear, cre-
g a shift from self-contained
works to a client/server virtual
work paradigm. An increasing-
phisticated user population
challenge today's existing
rity systems. As a result, a
breed of security technolo-
will emerge, integrating LAN,
N and Internet environments.

Noam Lotan

President and CEO
MRV Comm., Inc.

The leader in Fast Ethernet Switching will be the company with aggressive product development programs for next generation products, focusing on lower prices with increased functionality. The company will offer practical solutions for improving workgroup performance, while providing scalable migration paths to high-speed technologies on demand.

Brice Clark

Director of Strategic Planning
Hewlett-Packard Company

The key factor for the future of networking will be a dramatic increase in available bandwidth. This will allow people to do more and to do it faster. As the need for voice, video and other high end data to be transmitted grows, networking technology will expand in the form of increased bandwidth whether in wire based services or in a mobile environment.

William Donahoo

VP Marketing
Novell, Inc

Directory enabled client-network computing is what's in store! As a client on the network, people will have access to every type of computing resource wherever and whenever they need it. Data repositories, processor embedded devices, communication conduits, commerce transactions, collaborative applications, and all types of network computers will be easily accessed and managed by, you, the client. The directory will enable this all to happen.

ExecutiveBriefing

the next Millennium?

90's have brought Internet
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liferation of internetworking
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neously, for information
and access. We will rely
corporate-wide intranet as
kbone to powerful collab-
structures that ultimately
the way we interact and
esources.

Paul Severino

Chairman
Bay Networks, Inc.

As we advance into the next century, the network will be ubiquitous, and will play a key role in re-defining how people communicate and exchange information. Specifically, the network will provide the gateway that will support various daily activities, allowing people — from enterprise, branch and small offices as well as mobile, school and home environments — to conduct business, research and collect information, purchase products, communicate and learn.

Paul Kozlowski

Chairman
Racal Data Group

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Strong starters

10 network industry newcomers.

HOWARD FINE

By Barb Cole

COMPANY: AGILE NETWORKS, INC.
BASED: Boxborough, Mass.
PRIMARY PRODUCT: ATMizer, a device that combines Ethernet frame switching with ATM cell switching.
BUSINESS OUTLOOK: "They have a product that's clearly focused on the high-growth area of ATM, and what they have works. [President and CEO] Bill [Seifert] has shown his ability to set plans in motion, but also to be flexible enough to change."
Fred McClimans, principal, Decisys, Inc., Sterling, Va.

COMPANY: FIRST VIRTUAL CORP.
BASED: Santa Clara, Calif.
PRIMARY PRODUCTS: Switches and servers geared toward companies that wish to run data, voice and video applications at the desktop over ATM networks. First Virtual's products work with its Multi-media Operating Software, middleware that enables Windows applications to leverage ATM's quality of service.
BUSINESS OUTLOOK: "[Company president] Ralph [Ungermann] is a world-class entrepreneur that gets involved in the early stages of emerging technology. With First Virtual, he is pioneering another major technology that will solve the high-bandwidth and quality of service needs that most companies will have well into the next century."
Jim Swartz, managing partner, Accel Partners, San Francisco

COMPANY: HYBRID NETWORKS, INC.
BASED: Cupertino, Calif.
PRIMARY PRODUCT: Cable modems, and software and hardware for managing an IP network over broadband cable networks.
BUSINESS OUTLOOK: "Hybrid won't be the only player in this space, but it has a good head start and an excellent partnership with Intel."
Emily Nagel Green, analyst, Forrester Research, Inc., Cambridge, Mass.

COMPANY: INDUSTRY.NET CORP.
BASED: Pittsburgh
PRIMARY PRODUCT: The company, led by former Lotus Development Corp. CEO Jim Manzi, runs a Web supersite (http://www.industry.net) on which it hosts product and company information for more than 4,000 firms. The company will soon take the wraps off a trans- action system that lets companies make purchases directly via the Internet.
BUSINESS OUTLOOK: "Electronic transactions and collecting technical information about products [on the Internet] is the wave of the future. This company's strength is that it has a good understanding of the discreet manufacturing industry."
Catherine Hale, analyst, Dataquest, Inc., San Jose, Calif.

COMPANY: IPSILON NETWORKS, INC.
BASED: Palo Alto, Calif.
PRIMARY PRODUCT: IP Switch ATM 1600, which supports IP applications over high-speed ATM networks.
BUSINESS OUTLOOK: "What [Ipsilon] will deliver is all the benefits of ATM without the mess. Their box gives you incredible performance, as if you've gone to ATM, but it looks, feels and smells like a router."
Peter Sevcik, principal, Northeast Consulting Resources, Inc., Boston

COMPANY: THE MESA GROUP
BASED: Newton, Mass.
PRIMARY PRODUCT: Conference+, a groupware add-on to Microsoft Mail that provides replicated public folders for group discussions, document sharing and electronic forms.
BUSINESS OUTLOOK: "They're very technically savvy, and they're sitting at the intersection of [Microsoft] Exchange, the Internet and Notes. They have a chance to introduce some core technologies that simplify all of those areas."
Tom Austin, analyst, Gartner Group, Inc., Stamford, Conn.

COMPANY: OPEN MARKET, INC.
BASED: Cambridge, Mass.
PRIMARY PRODUCTS: Merchant Solution, hardware and software combination for building Web-based applications
BUSINESS OUTLOOK: "They've got a robust platform and appear to be talking to all the players in the financial payment industry. While it's still very early in the development of the Web, it's clear that Open Market is positioning itself to be the high-end provider."
Torrey Biles, analyst, Giga Information Group, Santa Clara, Calif.

COMPANY: SAHARA NETWORKS, INC.
BASED: Cheshire, Conn.
PRIMARY PRODUCT: ATM Channel Bank and JavaView, a Web-based tool for monitoring and managing the company's soon-to-be-released ATM access multiplexers.
BUSINESS OUTLOOK: "Sahara has a quality management team that seems to work well together. They have been able to keep this company in the public eye despite the fact that they haven't announced any products yet. They're not building the high-end switch that's going to conquer the world. Instead, they are offering building blocks for ATM access."
Charlie Robbins, analyst, Aberdeen Group, Inc., Boston

COMPANY: SPIDER TECHNOLOGIES, INC.
BASED: Palo Alto, Calif.
PRIMARY PRODUCT: Spider, a tool for linking Web browsers to corporate databases.
BUSINESS OUTLOOK: "Spider sells a small piece of an important puzzle that has to do with connecting Web pages to databases in a dynamic way. The company's future is bright because there will be a huge demand for software that can make first-generation Web sites more interactive."
Stan Dolberg, analyst, Forrester Research

COMPANY: VERISIGN, INC.
BASED: Mountain View, Calif.
PRIMARY PRODUCT: VeriSign's Online Certificate Authority allows browsers to request a server's digital identification and to confirm the identity of the merchant during an electronic transaction. This system is based on the Secure Sockets Layer protocol, which most Web servers are expected to support by this year.
BUSINESS OUTLOOK: "They have every major player [including CompuServe, O'Reilly and WebStar] in the industry lining up to do deals with them. They've got good management and a lot of deals to provide security for proprietary networks that will bring in short-term revenue until they can make money off the digital certificates business."
Rich Edwards, analyst, Robertson, Stephens & Co., San Francisco

Network World, we're only going to say this once:

Happy 10th Birthday.

■ After 100 years of building networks around businesses, Nortel wants to applaud a magazine built around networks. In a single decade, *Network World* has become the authoritative journal on networking. ■ In fact, a century after Nortel began to establish itself as the leader in enterprise networking, it's clear to us that our industry has never had a finer voice. ■

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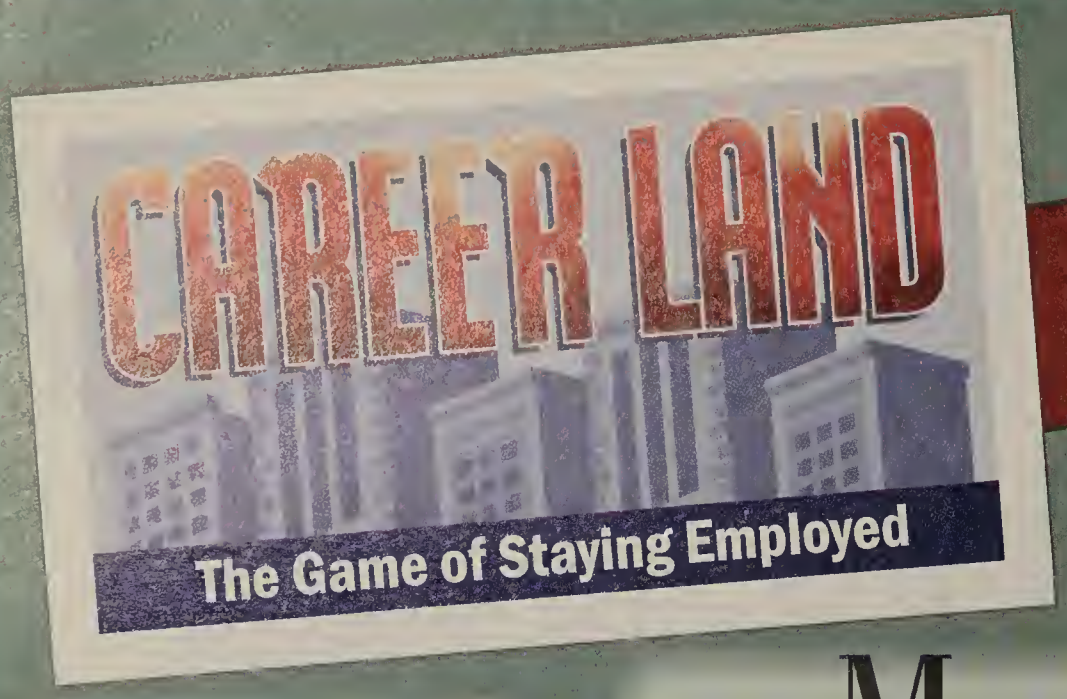


Moves to make

Skill and luck. Your career hinges on both. Be first to spot new trends and you can win. Stick with Arcnet after the world moves to ATM and you risk getting hung out to dry. To minimize Lady Luck's influence on your job in the next 10 years, here are some strategic moves to make and avoid. These tips were culled from consultants, recruiters, users and *Network World* staff.

By Joanie Wexler

1. Prepare your company to do business in a network-centric world, where applications run somewhere out in cyberspace rather than on a box over which you have complete control.

2. When upper management starts toying with the idea of outsourcing, ask to lead the charge instead of cowering in the corner. You could wind up in the catbird seat as the one who manages your company's relationship with the outsourcer instead of being among those who get shifted from one corporate payroll to another.

Also, begin to treat the network as a set of application services, not simply a means of connectivity, which Joe Outsourcer can handle all by himself. This attitude will help you find services you can continue to offer your company that the outsourcer cannot because "you will always know your company's business better," points out Ameet Patel, manager of technology development at BASF Corp.

3. When the competitive environment fostered by the telecom reform law comes about, be ready to play carriers off each other and milk them for the best deal possible. Just remember Divestiture I as you do so and go down in history as the person who saved your company a bundle when carriers started tripping over themselves for your company's business. Then put it on your resume.

4. Visit at least one trade show per year, and stay on the exhibit hall floor from open until close visiting vendors you currently don't do business with. This will tip you off to new ideas, technologies and trends you might not uncover in your daily routine or even lead to new job opportunities down the pike.

5. Keep your communications skills polished by writing at least one technical article and one opinion letter or column per year for a reputable and respected trade journal. Alternatively, give a presentation at a networking conference. This buys you the ability to make better sales pitches for your projects to upper management and also keeps your name out and about in the industry.

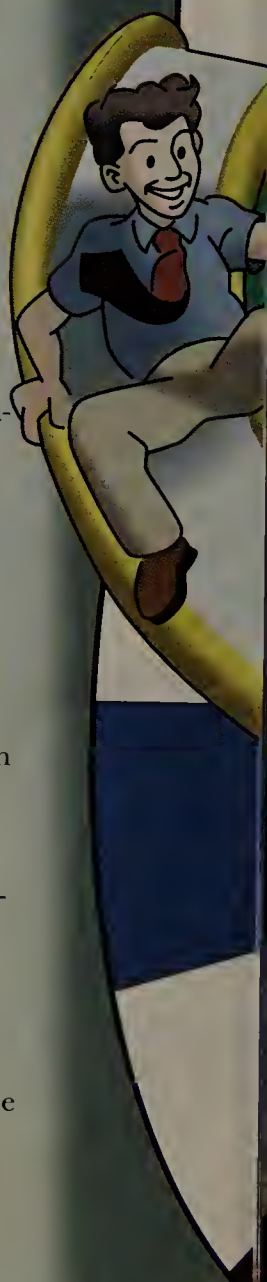
6. Gather a handful of well-respected individuals from within and outside the industry as your personal "board of directors" and meet with them two to four times per year to review your own personal business and career plans. Then return the favor.

7. Surround yourself with bright, organized, hard-working people who have different backgrounds and perspectives. "Your reputation and productivity are inextricably linked to the collective IQ and work habits of your immediate workgroup," says *Network World* contributing editor James Kobielus, a senior telecommunications analyst with LCC, L.L.C., an Arlington, Va.-based network design and engineering firm.

8. Devise a plan to deliver robust networking capabilities and data access to the mobile and remote workforces of the 21st century. This means that even if you've been a LAN bigot, it's time to learn about wide-area protocols and the telephone companies.

9. Get intimate with the nirvana operating system, Windows NT, which promises to eventually do everything short of changing the baby. This is particularly important to users of Banyan Systems, Inc. VINES, says Bill Sheehan, senior technology support specialist at Stone & Webster Engineering Corp., a VINES shop in Boston. "VINES reportedly has a nice future supporting the NT operating system."

10. If all else fails, what the heck? Accidentally erase the complete password file or Lotus Development Corp. Notes database the day before the 10th anniversary of your hiring or get a hacker to break into your network. This will ensure the company will need you to hang around for at least a while as it picks up the pieces. But you better cover your tracks.



Moves to avoid

1. Don't grab new technology too quickly; let it be proven first. By the same token, don't stay too long with an aging technology. But how do you judge when to make transitions?

"The trick is to not get seduced by immature technology," says John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo. Independent testing facilities are helpful, as is finding early users of new technologies and picking their brains, he says. "If you get out too far ahead, you're more likely to suffer service disruptions and have disappointed users — and that doesn't look too good to the management team."

2. Don't reduce your infrastructure investments. Basic communications devices, links, management systems, help desks and the like tend to get neglected when the budgetary squeeze is on. But keep pushing the chief financial officer even in tight times. It will pay off in showing you're prepared to buttress the network to support shifting business needs. If you can't quickly support those shifting needs, it will look like you failed.

3. Don't allow yourself to become pigeonholed into a single technology or job task. But if you find yourself in that situation, excel at that job or task by pushing the envelope. That can create a path to broader responsibilities that will eventually make you more marketable, as will accepting assignments on cross-functional teams or special projects, says Bob Floreak, vice president of human resources at Westinghouse Communications.

4. Don't allow fear or ego to keep you from stepping back from a management job to a technical one. Technology job opportunities are more abundant and often pay more.

5. Don't get locked into long-term telecommunications services contracts, even if the benefits look too good to believe — because they probably are. You don't want to be known as the one who saddled your company with a contract it couldn't live with.

6. Don't take anything a so-called technical expert has to say on faith. Instead, work through the technical logic and do your own calculations to measure performance or return on investment. This puts you in charge of your own destiny.

7. Don't be afraid to take calculated risks. "Sometimes learning from mistakes is a very effective way for people to develop their technical abilities," says Matt Villerot, senior analyst with S.C. Johnson & Son, Inc.

8. Don't let your overall skill set lag behind by getting too focused on managing only current projects using existing tools. Rather, stay on top of changes in project management techniques and quickly apply them as needed.

9. Don't give every employee unlimited Web access. When users get sucked into cyberspace and forget to do their jobs, upper management's fingers will probably point to you.

10. Don't make any of the mistakes on this page. If you do, have your resume ready.

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SUCCESSES
PAST TECHNOLOGIES
FAILURES

Top 10 critical technical developments of the past 10 years

10BASE-T: While Ethernet first emerged more than 10 years ago, it was the IEEE 802.3 committee's 10Base-T standard that brought the technology to the masses in the late '80s. The standard — which defined how to deploy Ethernet using unshielded twisted-pair wire — changed the very nature of LANs.

Gone was the need to snake expensive coaxial cable over or under every office to be served. 10Base-T specified the use of star topologies and wiring hubs, which made networks more reliable and easier to administer.

And once the industry settled on 10Base-T as the way to wire Ethernets, the price of hubs and network interface cards dropped dramatically, spurring the further acceptance of the technology.

LAN AND ATM SWITCHING: The advent of switching represented nothing short of the next major leap forward for LANs. The first Ethernet switch was introduced by Kalpana, Inc. in 1990. Unlike shared LAN technologies, where a fixed amount of bandwidth is divvied up among LAN-attached devices, switches made it possible to devote 10M bit/sec of capacity to each port, dramatically boosting network performance and throughput.

Now Asynchronous Transfer Mode is taking the switching concept a step further. Unlike other switched LAN technologies, ATM will support data, voice and video at speeds into the hundreds of megabits per second. ATM promises to be the first technology to span both the local and wide area.

WAN FIBER BUILD-OUT: Long-distance carriers are forever trotting out new and improved services, many of which are made possible by decisions reached nearly a decade ago to rebuild networks from the ground up using all digital fiber-optic technology. Sprint Corp. led the crusade when in 1987 the carrier announced it would replace all of the copper and microwave routes in its network with fiber. Other carriers hastened to follow suit, although many are still playing catch-up.

Besides paving the way for higher speed services, the inherent quality and reliability of all digital transmission made it possible to launch things like frame relay, which is essentially X.25 stripped of error correction and retransmission functions.

The fiber boom continues today, with Corning, Inc. selling 4.8 million kilometers of fiber to telephone carriers last year alone.

MOBILE/WIRELESS COMPUTING: Mobile and wireless computing advances in the last decade have virtually set the itinerant worker free. Cellular technologies let people on the fly dial anywhere in the world. And analog cellular modems, Cellular Digital Packet Data and other technologies make it possible to connect laptop computers to everything from remote LAN servers to the Internet. Anywhere, anytime computing has changed the way many companies do business.

And it's only going to get better. The billions of dollars carriers have spent on personal communications services licenses will result in a flock of new wireless network services, many of which will be accessed using evermore compact, lighter weight and feature-rich devices.

SNMP: While many of the grand network management schemes trotted out in the last decade died on the vine (see MOMs, page 105), the Simple Network Management Protocol has flourished.

Realizing they lacked adequate tools to manage the routers being used to tie together Internet regionals NYSERNET and SURANET, Jeff Case, Chuck Davin, Mark Fedor and Marty Schoffstall first created the Simple Gateway Monitoring Protocol in 1987. SNMP followed a year later for monitoring 'Net routers via management stations. Today, standardized SNMP management agents are in everything from routers to power supplies.

And while an attempt in the last few years to develop an SNMPv2 spec with security crashed amid the brawls of its codevelopers — Case, Marshall Rose, Keith McCloughrie — SNMPv1 lives on, helping managers control unruly nets.

E-MAIL: Electronic mail has been around for well over a decade, thanks to the Department of Defense, which wanted a means of secure communications in the event of nuclear disaster. But it wasn't until the mid-1980s that E-mail started to take off in the corporate world. By decade's end, it was well on its way to becoming one of the most widely used network applications.

Today, a downed E-mail system can cripple a company and lead to costly financial consequences. According to a study released last fall by the Electronic Messaging Association, there were 23 million E-mail users in 1994. That number will soar to 72 million by the year 2000.

CLIENT/SERVER COMPUTING: Local nets brought us the ability to share information and computing resources, but it was the advent of client/server technology that unlocked the true power of networking.

Dividing programs into client and server components made it possible to make better use of evermore powerful desktop computers — instead of using them like dumb terminals — and opened up a world of information in the form of all types of back-end servers.

The technology made it possible for companies to downsize mainframe-based applications to LAN-based systems and more easily customize applications.

WEB: It can be argued that the World-Wide Web has created more change in a shorter amount of time than even the advent of the PC or the LAN. Barely used in business circles a few years ago, today, anyone with a Web browser and Internet access can peruse a world full of information, from corporate postings and stock reports to government records and foreign telephone books. And every company under the sun has built or is building a Web presence.

The result: nothing short of reordering the way businesses use and disseminate information. Out is the push method. In is the posting of information coupled with powerful search tools that enable anyone to cobble together huge amounts of data about any subject.

ROUTING: Back in the 1970s, when the Department of Defense's Advanced Research Projects Agency was funding the packet-switched ARPA-Net, they weren't even called routers. They were called Internet gateways because routing was just one of many things they did, such as the conversion necessary to transmit packets between the wildly different networks springing up in the U.S., Japan and France.

From those early prototypes built by Bolt Beranek and Newman, Inc. and by Stanford University under Vint Cerf's watchful eye, the modern router emerged in the early '80s as government, academia and industry united behind a common version of TCP/IP.

Today, high-speed routers are the cornerstones of corporate backbones, making it possible to access a sales report on a server in London from a desktop in San Francisco.

GROUPWARE: Although the term groupware is still nebulous in the eyes of many, most agree that the basic concept of using collaborative technology to enable people to work together in teams is here to stay.

The idea burst onto the business scene in December 1989 when Lotus Development Corp. launched Notes, which the company simply referred to as "group communications software." Today, there are more than four million Notes users, and Lotus is selling more Notes seats than cc:Mail seats.

Many of the basic collaborative computing functions have been replicated in competing products, such as Novell, Inc.'s GroupWise, which is said to have some 5.5 million users. With IBM's acquisition of Lotus and the arrival of Microsoft Corp.'s Exchange Server, groupware is posed for even more significant growth.

Top 10 networking flops of the past 10 years

LAN MANAGER: LAN Manager was once an industry unto itself. The network operating system (NOS) developed in the late 1980s by Microsoft Corp. and 3Com Corp. to do battle with the NetWare juggernaut, had ignited the imagination of the industry and gained the backing of a huge number of vendors.

But it was all for naught. LAN Manager stalled at the gate, giving Microsoft, in particular, a huge black eye. Besides the fact that the NOS was delayed several times and was initially buggy, one reason the product failed was because few LAN Manager applications were ever delivered. Users were never able to move beyond the product's weak initial release to see LAN Manager as a serious challenger to Novell, Inc.

UNIX: No one would argue with the fact that Unix is a robust multitasking, multiuser operating system. But fragmented industry support left the door open for competing systems software. While not dead, Unix makes this list because it never lived up to its promise.

A perennial favorite in scientific circles, Unix showed signs of gaining commercial success in the mid-1980s when various vendors began to coalesce in two Unix camps: one formed by Sun Microsystems, Inc. and AT&T, and the other being the Open Software Foundation, Inc., which was backed by IBM, Digital Equipment Corp., Hewlett-Packard Co. and other computer makers.

But it was too little too late. Teamed as they were, the vendors still couldn't resolve their differences, and even two Unix camps proved one too many. Microsoft's Windows NT is now widely viewed as a Unix killer.

ISDN: There are those who argue otherwise, but for all intents and purposes, ISDN has been an outright failure. Nine years in the making, there are fewer than one million lines of ISDN in service nationwide.

First tariffed by Illinois Bell Telephone Co. in 1987, Integrated Services Digital Network has been the brunt of jokes ever since. It can deliver speeds up to 128K bit/sec over a regular voice phone line, but equipment incompatibility and the failure of local exchange carriers to market and provision the service have hindered demand.

Can it rise from the ashes on the back of the Internet, as a way for home office and small business users to access the 'Net at high speed? Maybe. But telecom reform will bring on a slew of competing technologies that may brush ISDN under the rug once and for all. ISDN will plug the gap in the interim, but a few years from now, ISDN may stand for "It Should Die Now."

CO LANs: Central office LANs were one of those ideas that should never have made it off the drawing board. LECs, having some success with Centrex services, reasoned that the CO switches they used to support telephones at corporate offices could just as easily link data devices. In early 1990, Pacific Telesis Group and Bell Atlantic Corp. were reaping praise for their leadership in offering 56K bit/sec CO LAN services. By spring of the following year, PacTel had all but dropped the service. "CO LANs handled LAN traffic ineptly," a PacTel official said in 1991.

Simply put: Looping data links all the way out through a local exchange switch just to reach the office down the hall was ludicrous when faster, simpler LAN technology was readily available.

OSI: There is perhaps no more glorious failure in the history of the net industry than that of the Open Systems Interconnection model. Trumpeted by the federal government and powerhouse firms such as The Boeing Co. and General Motors Corp., OSI was going to rectify all network wrongs, make it possible for any compliant device to communicate sensibly with any other OSI-based gizmo.

But today the OSI dream is gone. Only the OSI X.400 messaging application can count as a real-world success out of the dozens of complex OSI standards that international committees compiled on paper and the paper promises of vendor hype.

What killed it? The standards were based on least common denominator technology, and vendors were always adding their own spin to boost functionality and corner markets. OSI products were rarely interoperable out of the box. And while OSI spun its wheels, there was the rise of this simpler, less ambitious thing called TCP/IP.

DCE: Another grand scheme that has faltered under the weight of its own ambition is the Open Software Foundation, Inc.'s Distributed Computing Environment. Backed by Digital Equipment Corp., IBM, HP and others, DCE was conceived as a set of standard services that would make it possible to create secure, portable applications capable of interacting with any and all DCE-compliant applications scattered across an enterprise.

While many Fortune 500 firms have tested DCE, it is still a revolution waiting to happen and is in jeopardy of fading away. Though more DCE tools are becoming available, the complicated application programming involved means only the most determined companies capable and willing to deconstruct their computing environments are remaking themselves in the image of DCE.

DCE is a failure in that many would have liked to see DCE more broadly supported by now.

PBXs AS LAN ALTERNATIVES: The so-called fourth-generation private branch exchange was going to put an end to the long-running debate about whether companies really needed to install LANs simply to link data devices. After all, offices already had PBX ports — just beef up the switch and shuttle data through that.

Start-ups such as Ztel, Inc. were funded with some $75 million in venture capital to do just that: build big switches with LAN-like data carrying capabilities. But users weren't buying it. Seemed only marginally less silly than using CO LANs. For one, it drove up the cost of the phone switch. And two, it raised concerns about single points of failure. The whole concept went down in flames.

Ironically, if Asynchronous Transfer Mode is successful at finally uniting voice and data, we may ultimately work our way back to this concept.

PDAs: Personal digital assistants were going to eclipse the laptop as the tool for the traveling businessperson. They were small, lightweight, capable of accepting instructions scribbled on a pressure-sensitive pad with a quill and designed to support wireless links.

Never happened. Tools such as Apple Computer, Inc.'s Newton — only the most visible flop — have met with huge consumer apathy. The idea of transmitting poorly scribed messages electronically didn't seem to fit with the real needs of business.

That isn't to say, however, that handhelds on the whole are dead and gone. On the contrary, the less glamorous devices with small keyboards are seen with increasing regularity at airports and in phone booth queues.

BROADBAND LANs: Now long forgotten, when LANs first arrived in the early 1980s, there was a battle for supremacy between Ethernet (token ring was still a ways off) and a different breed of product called the broadband LAN. These LANs were built like cable TV nets — with headends and repeaters — and bandwidth was divvied up into different channels. Some channels were reserved for asynchronous communications, others were dedicated to synchronous traffic, and still others were reserved for isochronous video channels.

The battle was nip and tuck in the early goings, but broadband LANs ultimately proved too hard to engineer, too hard to maintain and too feature-rich — video support still isn't a requirement to this day.

Long live Ethernet.

MOMs: As with many new technologies, the industry's eyes are often bigger than its stomach. So was the case with the manager of managers concept.

When network management first bloomed, every vendor under the sun rolled out tools to control their specific products, such as LAN hubs. Shortly thereafter, the big thinkers in the game saw an opportunity to create a management system that could manage those managers, theoretically making it possible to control all network components from a single workstation.

AT&T trotted out Accumaster Integrator, and others followed suit. But in the end, the task proved too complicated, the goal too ambitious. While it was possible to get central systems to monitor other managers, controlling them was another thing. The MOM concept was eventually dropped.

SUCCESSES FUTURE TECHNOLOGIES FAILURES

Top 10 technologies that will shape the next 10 years

LIGHT: Optics will change the way everything is done, creating a world of nearly unlimited performance.

Theoretically, light can overcome the physical limitations of silicon. Unfortunately, some of these promises have not been realized. For instance, totally optical processors have been expected for years, but so far, prototypes have done little more than add simple numbers.

Optical breakthroughs, however, are being made in other areas, such as data transmission.

One of the futuristic technologies that vendors such as IBM are looking at is Wave Division Multiplexing — a technology that transmits different types of data at distinct optical wavelengths, or colors, over a single channel.

The IBM MuxMaster employs lasers to send as many as 20 simultaneous datastreams, such as text, video and audio files, over a fiber-optic line.

Meanwhile, AT&T's Lucent Technologies, Inc. spin-off is working on photonic switching, which combines optics and electronics.

REALLY GOOD VIDEO: Video will become a data type as ubiquitous as voice or numbers. With bandwidth issues solved (we hope), videoconferencing — though slow to catch on so far — will become standard issue.

But there is a larger and richer possibility: video so good that people can share an entire environment. Imagine being connected to a coworker over a high-bandwidth net. A multidimensional video camera feeds into a wide-screen display. The effect is like being in the same room. And with the 'Net broadcasting sound over the M-bone, you can share programming, such as radio. After that, look for holographic or three-dimensional images and sound.

NETWORKED AIRWAVES: The airwaves will be awfully busy in the next decade as personal communications services licensees launch services and satellite communications take hold.

No. 1 advantage? Competition that brings in new services and drives down price. A key technical advance? Constant connectivity to the Internet. Imagine always having access to the information superhighway. This changes everything. Your electronic mail is always there, and data and applets are always accessible.

According to Peter Weinberger, networking research vice president for AT&T Research in Murray Hill, N.J., a satellite antenna can be similar to the 18-inch dishes used for digital TV transmission. "You could be on-line all the time," he says.

'NET MOVES FROM ABSTRACT TO REAL: The 'Net today looks pretty real. It has color, graphics and modest amounts of sound, video and animation. But all of this is essentially an abstract or watered-down representation of reality.

Remember PCs in the early '80s? Information about people, places and things was reduced to text and numbers. Today, PCs have no trouble representing reality with, well, reality. CD-quality sound and full-motion video are the norm.

Those same capabilities will hit the 'Net, but that won't be all. Higher bandwidth nets and broadband access to the home — through ISDN, cable modems, Asymmetrical Digital Subscriber Line or satellite — will open up a world where virtual reality, holograms, true voice and full motion are not just possible but expected.

GLYPHS: The paperless office may never arrive, but that doesn't mean our hard copy can't be computerized or, perhaps, re-computerized.

Through a technology called glyphs, a printed document can contain computer instructions, everything from fonts and formatting to links to back-end databases. Xerox Corp.'s Palo Alto Research Center has developed these glyphs, using shading a bit like bar codes, that can be understood by smart copiers, scanners and fax machines. Recent research at MIT also shows that even hardcover books can be digital. Researchers are working on a system that allows people to download the contents of a book into a physical book-like device.

ELECTRIC MONEY: First there were stones and grain. Then came coins and bills. After that? Credit cards and checks.

In the future, though, money will just be information, and information in this age exists largely in the ephemeral world of digital memory. Electric money, or cybercash, is already beginning to emerge and can only get bigger. It won't be just Web sites that accept E-cash. "People will be able to look at a virtual vending machine, put in the E-cash and digital signature, and buy anything," says Todd Dagres, partner with Battery Ventures, a Boston-based venture capital firm.

One problem, security, could be solved next year when "secure silicon" emerges. Secure silicon is a microprocessor with memory that can store encryption keys.

SMART MANUFACTURING: Ever walk into a store and see an item that is almost perfect? Today, you are stuck with what's on the shelves. But later in this decade, as smart manufacturing systems emerge, you won't be.

Smart manufacturing is the ability of back-end production systems to listen to instructions and spit out custom products like that shirt you like, for instance, except in brown instead of purple. Customers could request merchandise from a retailer, which passes that information along to the manufacturer on-line and waits for the order to be confirmed and scheduled. Customers could also do the ordering themselves using kiosks or Web sites.

UNIVERSAL CLIENTS: Windows 95 was the hot thing for a while, until it shipped. Once people got a look at this multitasking memory hog, the excitement faded. It was, after all, just an operating system. Tired of using an operating system to launch a kazillion different applications, each with its own idiosyncrasies, users now want something else. Something simple, for once. Something like a universal client. The idea is to have one interface that can access data wherever it resides and use that same interface to launch productivity tools to work on the data. Lotus Development Corp. hoped that client would be Notes. A more likely bet is a Web browser. Even Microsoft Corp. Chairman and CEO Bill Gates backs this idea. "Everything should be accessed through the browser," he says.

DISTRIBUTED OBJECTS: Ten years ago, objects barely existed. Ten years from now, they will be everywhere. Microsoft, which owns the operating system, will help make this happen. Its next version of Windows NT, dubbed 4.0, will include the first iteration of Network OLE, which lets Windows-oriented objects interact over a net. But the real Microsoft deal will emerge in 1997, when the company hopes to ship Cairo, an NT rewrite that will include an object-oriented distributed file system.

What does this all mean? It could allow users to access data, applications and pieces of applications regardless of where they reside. In fact, a user could construct a complete working application from objects scattered across the network. "Every piece of middleware, SQL, RPCs, ORBs, HTTP will use distributed objects. It's all starting now, even on the Web," says Chris Stone, president of the Object Management Group in Framingham, Mass.

NEURAL NETWORKS, NO REALLY: Networking old-timers have heard all the promises about neural networks, networks that respond to change based on data patterns. The reality of neural nets has been as disappointing as its close relative, artificial intelligence. They have gone nowhere.

But at least one prominent industry analyzer believes the next decade will be different. "The biggest thing we are looking at is neural networks, or networks that solve problems by themselves, that discover and fix problems before they become serious dilemmas," says Howard Anderson, president of The Yankee Group, a Boston-based consultancy.

SUCCESSES

FUTURE TECHNOLOGIES

FAILURES

Top 10 technologies that will fail in the next 10 years

ON-LINE SERVICES: We are just a few years into the World-Wide Web revolution, and already proprietary on-line content providers are reeling. Despite fears that The Microsoft Network would lay waste to on-line providers, the Web instead stuck it to Microsoft's plans, forcing the software giant to recast its service in the Web's image.

In a similar vein, telecommunications kingpin AT&T was forced to scrap its plans to launch InterChange as a traditional on-line service. InterChange was designed around sophisticated new ways to present information. Unfortunately, it wasn't HTML. InterChange is now just another Web site.

The big guys learned the hard way what we all now know: When it comes to on-line, proprietary is simply dead. Instead, new technologies and techniques will be applied to the Web, which will make today's closed on-line environments look lame in comparison.

LOW-SPEED SHARED LANs: It seemed like a good idea at the time: Build a LAN where users share a wire, each getting a portion of the overall capacity. Everything was fine for a while. LANs were fairly small, and traffic was light, mostly documents going off to a shared printer or some simple file sharing.

But the multimedia explosion and the huge growth of LANs have shown the low-speed shared-media model to be a bit bankrupt. The answer, of course, is a combination of high-speed LANs, 100M bit/sec moving to a gigabyte and switching that turns this full power on for individuals when they need it. See ya' later, 10M bit/sec Ethernet and 4M and 16M bit/sec token ring. Say hi to Arcnet for us.

ATM 25 AND 100VG-ANYLAN: Some fairly hot LAN-ish technologies, ATM 25 and 100VG-AnyLAN will also bite the dust. What will these technologies be 10 years from now? Too slow. What will replace them? Something faster.

"Clearly, ATM to the desktop will be different — it will be much higher speed to the desktop than 25M bit/sec," says Jim Breyer, managing partner with Accel Partners, a venture capital firm in San Francisco.

100VG-AnyLAN, meanwhile, will not just suffer from the move to 1G-byte transmission, but will also be the victim of politics; the Fast Ethernet camp is just too powerful. Even HP is now supporting Fast Ethernet.

PBXs: The bastion of telecommunications, the mighty PBX, is finally threatened. No, it won't happen overnight. And its demise may not be complete by the year 2006, but the voice counterpart to data processing's mainframe will be slowly replaced by voice-over-ATM technology. Imagine the possibilities: clean, efficient voice passing over the same advanced LAN and backbone technology now being installed for data, the mostly separate worlds of voice and data finally integrated.

The answer for the PBX market leaders has a familiar ring: ATM. This summer, Nortel aims to leverage its data switching expertise by merging the Magellan Passport enterprise switch that feeds ATM cellstreams to the wide area with its flagship Meridian 1 PBX in a single box dubbed the Meridian Passport. Lucent, meanwhile, will be gradually changing out the switching fabric of its flagship Definity G3 switch to ATM by 1998.

SNA AS YOU KNOW IT: Old protocols never die, people just forget they are around. Ten years from now, people may he saying, "SNA? How do you spell it?"

This IS mainstay may not go away completely, but it sure will seem like it.

"SNA as backbone technology is history, hut the applications will live on indefinitely," says Todd Dagres, a partner with Battery Ventures, a Boston-based venture capital firm. "There are too many billions of dollars in applications for it to fade."

Big chunks of SNA, however, will meet their maker. SNA controllers and dumb 3270 terminals? Stick a fork in 'em, experts say.

MORE OLD PROTOCOLS: What can we say about IPX, NETBIOS and AppleTalk? We'll miss you . . . not! What will replace these crusty old technologies? "IP will take over the world," Dagres says.

Helping to fuel the IP takeover are intranets. Sure, the Internet is everywhere and has helped IP become so pervasive, but it is these private Web-like networks that will keep it so.

Messaging and other software vendors are already scrambling to talk IP, and talk it well. A whole slew of collaborative tools are also being built for intranets and the Internet. Workflow, document and image processing — you name it, it's on the way.

And what do you think all these home networks are going to be talking anyway?

NOSes THAT JUST NOS: Network operating systems were a great idea before the era of distributed applications. All they had to do was connect up a few PCs and let them share a little data and a couple of fundamental services. Nowadays, a NOS has to do everything, tackle old-line file-and-print services while handling a robust client/server application or two. Microsoft figured this out with Windows NT, a great applications server that is on its way to becoming a pretty cool NOS.

Now the pressure is on Novell to turn NetWare into a state-of-the-art applications server. The firm will probably succeed, just in time to face Microsoft's Cairo.

ROUTERS: Lots of folks, especially those who sell switches, have predicted the demise of the router. So far, they have been dead wrong. In fact, Cisco is cookin'. But sometime in the near future, they may finally be proven at least partially right.

According to experts, routers won't really disappear; they will just change. Instead of giving up the ghost in favor of switches, routers will simply add switching.

What we now call a router will also change its place in the net. "The hig central router just won't be needed anymore. Routing will be out at the edges of the network, and switches will be handling everything more efficiently," Dagres says.

Ironically, the same switches that threaten dedicated routers are adding an important new Layer 3 feature: routing.

FILE SERVER E-MAIL: After years of waiting for client/server messaging products, the end is near. Microsoft Exchange finally shipped (after some six years of effort), and Notes Release 4.0 featuring a high-quality E-mail interface is also here. Later this year, Novell's GroupWise XTD should ship.

Meanwhile, Oracle and HP are revamping their servers, hoping for a piece of the action. But the user migration to these new systems could take us well into the next century. When something works, even a clunky old E-mail system, it tends to stay put.

Eventually, though, the advantages of this new messaging architecture will force the issue. Client/server messaging, by sharing the processing among different computers, can improve performance and scalability.

This architecture also opens up new information-sharing possibilities, allowing E-mail users to share work on documents and enjoy more advanced bulletin boards and conferencing. But these systems still need to answer the question of the hour: How will they integrate with the 'Net?

ANALOG ANYTHING: Searching for analog devices is easy now. Phones, TVs, modems. Heck, they're mostly analog.

That situation just ain't going to last. Video will be mostly digital, except for the possible growth of cheap analog videoconferencing system that run on departmental LANs.

Phones are already going digital, and modems for cable, ISDN, ADSL and perhaps satellite radio will push analog anything into the fringes. "There is going to be a massive migration to digital in business and to the home," predicts Dagres.

The billions paid for PCS licenses ensure that another technology will go digital, cellular telephony. New digital services will arrive that are cheap (competition is a wonderful thing), clear and just right for voice or data. Analog cellular might not completely die, but it will at least have a whiff about it.

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Ten on Ten

Ten captains of industry field 10 questions about the industry, their careers and the future.

John Chambers
President and CEO, Cisco Systems, Inc.

Q: What percentage of Cisco's revenue will come from the sale of routers in the year 2001?
A: We don't break down revenues by product category. Routers are and will continue to be an important revenue stream.

Q: Can you give us an idea of what other types of products will make up the balance of sales by then?
A: We're planning our future by market segments rather than product categories. We see service providers accounting for perhaps as much as half our revenues, with large corporate customers and small/medium businesses making up the remainder.

Q: What three companies will dominate the LAN/network scene by 2001?
A: Cisco, Cisco, Cisco — one leader, followed by second-tier players.

Q: Looking 10 years out, what markets might you enter through acquisition, and what markets will you avoid?
A: Our intention is to be No. 1 or No. 2 in any market segment where we choose to compete. But I'd be kidding both of us if I thought I could predict our business two years from now, much less 10. Our priorities are first to develop ourselves, then to partner and finally, to acquire.

Q: What, if anything, does the emergence of the information-enabled home-based consumer mean to a company like Cisco?
A: It means tremendous opportunity for us, given strong relationships with service providers like telcos, Internet service providers and cable companies. The opportunity we see is in services to the home, more than devices.

Q: Will the Web change the way Cisco does business?
A: The Web has had a major impact on our customer service, our field sales support and many internal functions.

Q: Fortune 500 corporate backbones will typically operate at what speed in the year 2001? In 2006?
A: In 2001, OC-3 [155M bit/sec]. In 2006, OC-12 [600M bit/sec].

Q: What is your management philosophy?
A: Be driven by customer satisfaction. Be No. 1 or No. 2, or don't compete. Embrace partnering as the way of the future. Constantly evolve the organization; never be complacent. Develop the management team and contributions of individuals.

Q: What is your greatest achievement?
A: On the business side, the quality of our leadership team at Cisco. On the personal side, seeing our two children grow into young adulthood.

Q: If you could go back and do one thing differently, what would it be?
A: Move faster to market segmentation and a business-unit structure. That could have resulted in another 5% to 10% market share in each market segment.

Robert Frankenberg
Chairman and CEO, Novell, Inc.

Q: Did you have any misgivings about shedding many of the companies Ray Noorda bought?
A: Our goal has been to focus Novell on the high-growth networking and network services business. We have succeeded with no misgivings.

Q: What effect do you think your tenure has had on the culture of Novell?
A: We have become even more focused on addressing the unmet needs of our customers, resellers and technology partners.

Q: How do you plan to stave off Microsoft's NT Trojan horse strategy?
A: We will provide the best and most manageable networks and network services for all clients, application servers and intelligent devices, not just the ones that run our operating software.

Q: What role will Microsoft play in networking in 10 years?
A: The same role they play today — providing products at the end points of networks Novell and its partners create.

Q: How do you think the different cultures of Microsoft and Novell have affected the NT vs. NetWare competition?
A: The difference is a culture of networking, which means providing freedom of choice and the abilit to connect what is in the user's world vs. a culture attempting to reduce the user options to one com pany's products.

Q: Do you think it is necessary for a high-tech company to have a visionary executive to push its tec nological development and evangelize its products?
A: Yes, but it is much better when there are many eva gelists and many visionaries adding their contrib tions to make it better, make it robust and make i real.

Q: How do you spend your spare time?
A: I don't have much spare time, but when I do mak some, I like to fish, read and cook.

Q: If you were to change careers, what would you do
A: I'd be a science fiction writer.

Q: What is the strangest thing that has ever happen to you while on the road?
A: On a JAL flight to Japan, I asked the person next me why he dove into his briefcase, retrieved a pe and pad, and began scribbling furiously in Kanji after hearing an announcement in Japanese. He replied, "I am writing a good-bye letter to my wif so she can read it after the crash."

Q: What book have you read recently that has had impact on you?
A: *Built to Last*, a study of companies that have built solid value, successfully evolved, made change w k for them and withstood the test of time.

Eric Benhamou

CEO, 3Com Corp.

Q: Guesstimating, what percentage of all LAN ports will be switch-based by the year 2001?
A: A very large number.

Q: By 2006?
A: An even larger number yet.

Q: What three companies will dominate the LAN scene by 2001?
A: 3Com and Cisco. I am unclear as to who would be the most likely third player.

Q: Will networking ever become so universally available, so easy to use, that publications like *Network World* will become obsolete?
A: A greater risk of obsolescence would be for *Network World* to deliver shallow, sensational coverage about an industry that fundamentally prefers high content over hype.

Q: Will swelling bandwidth needs make photonic switching a necessity within 10 years?
A: I can think of a dozen technology trends that are more important to bandwidth expansion than this one.

Q: Will mainframes survive as network "servers?"
A: With major difficulty and through severe dieting.

Q: Will Java and the Web change computing as we know it, or is Bill Gates safe for now?
A: Yes, and yes.

Q: What, if any, type of career did you have in mind in college?
A: I wanted to be an entrepreneur.

Q: If you had to do it all over again, would you do anything differently?
A: Perhaps, but not very much.

Q: What will you do when you retire?
A: I will discuss it with my wife.

Tim Berners-Lee

Associate director of MIT's Lab for Computer Science and principal research scientist and director of the World-Wide Web Consortium

Q: Where were you when the idea for the Web hit you?
A: In Europe, mostly. In England, Wales, France, Switzerland. These things come together subconsciously from many parts during chatting and thinking about other things.

Q: Did you think it would become a hot business tool so fast?
A: Fast? For the first couple of years, it was hard to convince many people it wasn't too complicated, too ambitious or too confusing.

Q: If you could do HTML all over again, would you do it differently?
A: Definitely. I would not use SGML syntax. It would be a nested set of objects much more like NeXTStep or Andrew objects, extendable by downloadable code. Then again, that would never have taken off in the community.

Q: A lot of vendors have made money off HTML. Have you?
A: No.

Q: Some corporations are spending over $1 million to launch their Web sites. Does that shock you?
A: No. We are talking about setting up the fabric of communication and shared understanding within and without their companies. That's important.

Q: What do you love about the Web?
A: Its diversity.

Q: What do you hate about the Web?
A: The fact that every browser isn't an editor, every reader a writer. And the phrase "click here."

Q: How will the Web change in the future?
A: Check out www.w3.org.

Q: What are your favorite Web sites?
A: The oxygen-lit barbeque (www.ghg.ecn.purdue.edu), www.sunday-times.co.uk, and ours because its what I use every day.

Q: From the U.S. to China, governments are trying to control Internet content. Can they?
A: When parents can use PICS systems [the Platform for Internet Content Selection code Berners-Lee developed for content filtering], the U.S. government should not feel the need to try. In the end, widespread political censorship is bound to fail, and I hope the Internet makes that true.

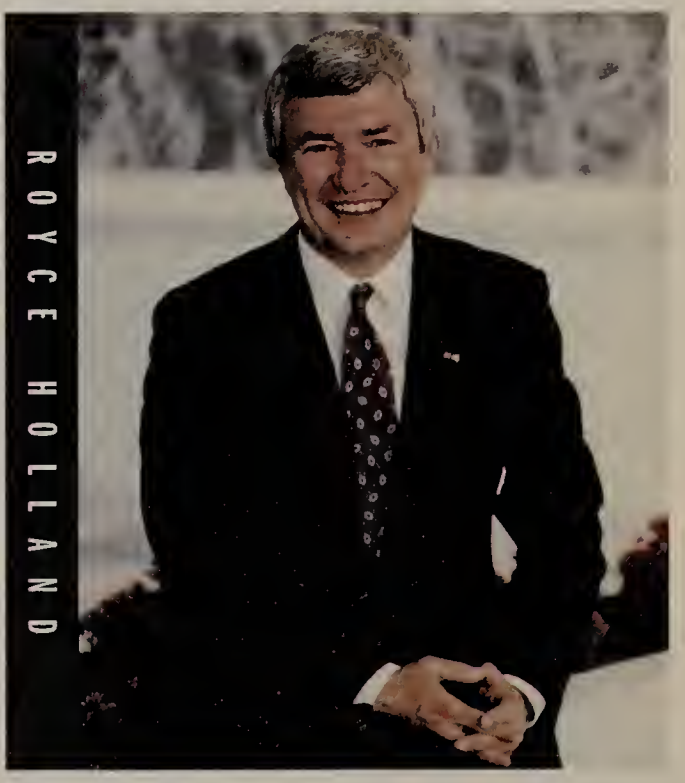
Royce Holland

President and chief operating officer of alternative access provider MFS Communications Company, Inc.

Q: How many RBOCs will be left in the year 2000?
A: My best guess is that mergers and consolidations will result in about four surviving regional Bell operating companies.

Q: What will their names be?
A: Well, two of them will be the Really Big Operating-Company (RBOC) and Bell Integrated Giant (BIG). Of course, the only thing less responsive and slower moving than one monopoly is a combination thereof.

Q: If you were a large business customer, what is the maximum length service contract you would sign, given the bargains promised by deregulation?
A: Length of contract in a competitive and rapidly changing market will be proportional to band-



width. Longer term commitments will be made for broader band services.

Q: What three areas will we see alternative access providers get into?
A: It's already happened in New York, Illinois and other pro-competitive states. CAPs will offer an array of switched local and long-distance services, broadband data over ATM platforms and facilities management.

Q: What does ISDN stand for?
A: For years, ISDN stood for "I Still Don't Need" it. Thanks to the explosive growth of the Internet, it will stand for the "Internet Sure Does Need" it.

Q: What is the most important benefit users will get out of increased telecom competition?
A: A choice. Like after the collapse of the Berlin Wall, more than one name will appear on the ballot.

Q: What is the biggest downside to telecom reform?
A: Too many goodies to choose from. This should be mitigated by the availability of one-stop shopping in a competitive environment.

Q: What is the most significant factor that will drive wide-area networking over the next 10 years?
A: There are actually three: the integration of voice, data and video over ATM/SONET platforms; the continuing trend to distributed processing; and the continued growth of the Internet.

Q: In what ways will the Internet become integral to corporate networks?
A: The Internet may well become a major mode of commerce and transaction processing for many businesses.

Q: During your career, what event had the biggest impact on the shape of telecommunications?
A: The FCC's Interconnection Order in September 1992 [mandating local exchange carriers connect with CAP networks] provided a beachhead for the later dismantling of the local telephone monopoly at the state and, ultimately, federal levels.

Scott Adams

Author of the nationally syndicated Dilbert cartoon

Q: How are Dilbert and Bill Gates most alike?
A: They both have an abundance of indefinable sex appeal. And glasses.

Q: Which cartoon character (not one of your own) will adapt best to networks of the future?
A: I'd have to go with Marmaduke. He wouldn't be too concerned with content, and I think that will be an important trait .

Q: Which would be most challenged?
A: I don't think Cathy would have the patience to configure a router. That's just a hunch.

Q: What new, as yet uninvented, computer technology would make Dilbert happiest?
A: I think we're all waiting for the day when virtual reality is better than dating. It might cause the extinction of our species, but that's a risk I'm willing to take.

Q: If you could trade places with anyone in the computer industry, who would it be?
A: I'd like to be Marc Andreessen for the next few years to enjoy the downward spiral of uncontrolled debauchery that accompanies early wealth. Then I'd trade back just before the Ferrari hits the phone pole.

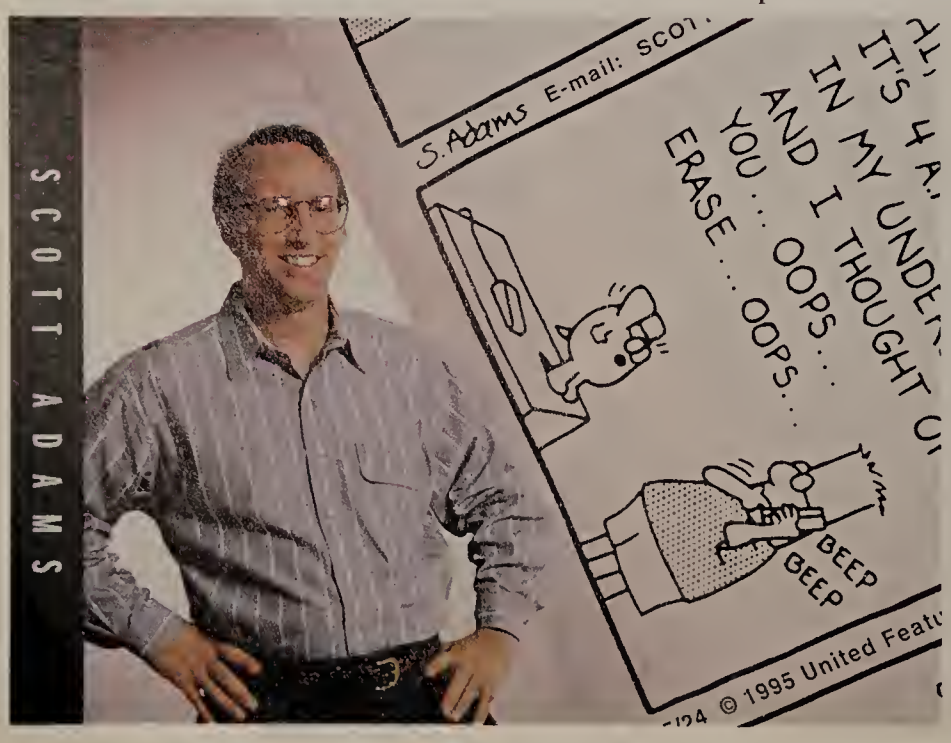
Q: Describe the network manager of the future.
A: Based on a straight-line projection of current trends, he'll be a 6-year-old boy with glasses the size of a minivan and a personality that makes Stalin look like Mr. Rogers.

Q: What are your favorite and least favorite computer-related acronyms?
A: SCSI is my favorite because you can use it to insult your computer without incurring its wrath. Unix bothers me because I imagine the sounds "snip, poink-poink" when I hear it.

Q: Who has a greater impact on the computer business, Scott Adams drawing Dilbert or Scott Adams working as an engineer for Pacific Bell?
A: Is Pacific Bell the PC maker or the phone company? I always get them confused.

Q: Dilbert's mom seems to know more about the computer business than her son. How does her view differ?
A: Dilbert uses a variety of computer platforms. His mom is more of a Unix bigot.

Q: You're stranded alone on a desert island with your laptop. The computer gods grant you access to three Web sites. Which would you choose?
A: First, I'd want the Web site of the computer gods so I could flame them for forgetting to give me AC power. Then I'd ask for the *Penthouse* Web site and the Dilbert Zone. That way, I could get an erotic thrill and look at naked women.

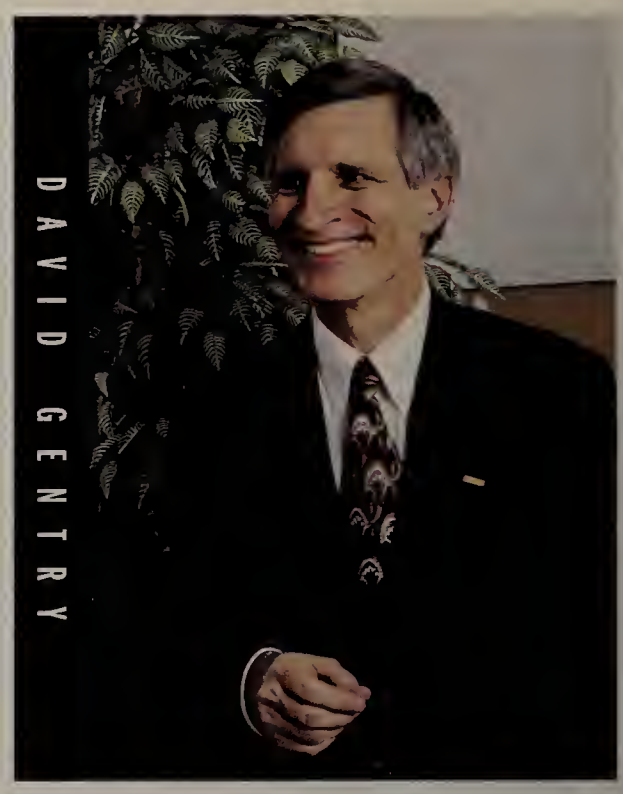


David Gentry

Chairman of the ANSI X12 finance subcommittee and "corporate relations senior manager treasury management services" at SunTrust Banks, Inc.

Q: Has the tradition of big firms forcing suppliers to use EDI helped or hurt the cause?
A: Helped, because most of us need a kick in the pants before we make a significant change.

Q: Why does EDI cost so darn much?
A: Compared to its benefits, EDI does not cost much.



Q: What's the best EDI experience you ever had with a trading partner?
A: The day two major trading partners flew in their EDI coordinators and MIS, accounts payable and receivable staffs to meet with the carrier and [the bank] to identify the impact EDI would have on everyone.

Q: What's the worst?
A: One time we accomplished 90% of our work only t have our trading partner cancel the project due to lack of senior management commitment.

Q: What needs to be done to cause EDI to grow mor rapidly?
A: Call it something other than EDI.

Q: Is EDIFACT going to replace ANSI X12?
A: Not in my lifetime — and probably not in yours.

Q: Will EDI ever take off on the Internet?
A: For nonfinancial transactions, yes. For financial transactions, the jury is still out. Security needs to be proven beyond a shadow of a doubt. Reliability and timing issues remain.

Q: What would you change about EDI if you could?
A: Make it easier to implement.

Q: What's the biggest lie you've heard about EDI?
A: That it's for techies, instead of for business people and techies.

Q: What advice would you give to EDI newcomers?
A: Use it as one tool among many — from E-mail to outsourcing — to solve business problems.

Craig Benson

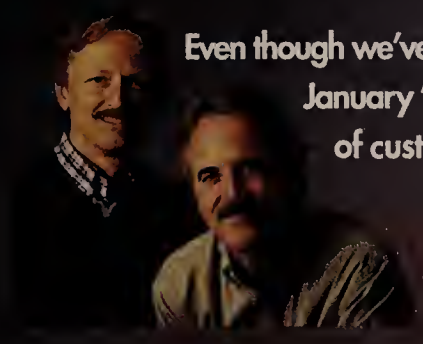
Chief operating officer, Cabletron Systems, Inc.

Q: If your company's success over the next 10 years were to hinge on one thing, what would it be?
A: Listening to the customer and continued innovations from our employees.

Q: What is the biggest misconception about your fir
A: Cabletron is unwilling to engage in acquisitions. V are continually examining potential acquisitions and partnerships.

Q: What do you anticipate to be your customers' N 1 network need going forward?
A: Simplifying the management and operation of t network.

"Virtual Vineyards is a direct marketer of premium wines and gourmet foods. We do everything over the Internet. Orders are placed by consumers directly through our Web site, and many of our internal corporate functions operate over the Net using browser-based applications. This is a company where on-line connectivity is everything.



Even though we've only been in business since the end of January '95, we're already servicing thousands of customers all over the world.

ROBERT OLSON,
PRESIDENT, VIRTUAL VINEYARDS

PETER GRANOFF,
VICE PRESIDENT, CHIEF CORK DORK

"SINCE WE STARTED MARKETING WINE ON THE WEB, OUR REVENUES HAVE BEEN INCREASING 30% A MONTH."

This company couldn't have happened before the Internet. The Internet breaks the hold geography has on distribution.

We started out with a local Internet service provider, but they couldn't keep up with us. We're a 24-hour, 7-day-a-week business. If our lines are down, we're not taking orders, which means we're not doing business.

We decided to look for another provider and found PSINet®. Not only are they head and shoulders above the rest in technology and service, they're also very price competitive.

And when PSINet told me about their InterMAN service, all I could think was, this is a perfect fit for my needs. InterMAN's versatility meant our Internet service could grow as we grew.

We can count on PSINet to be there for us anytime of the day or night. They're a service business that never sleeps. Which means, I can."

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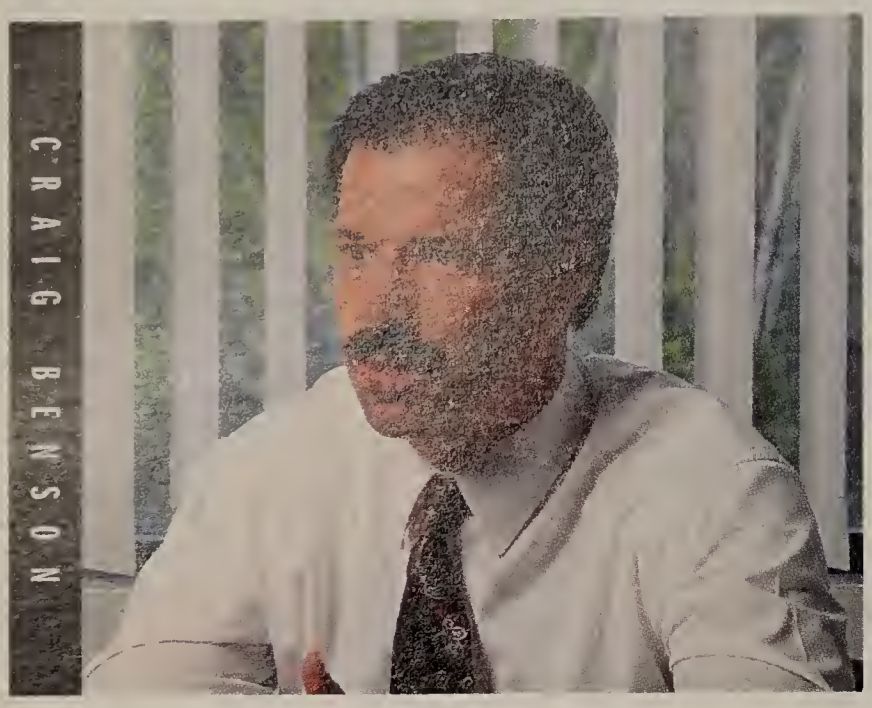

Q: What network vendors will still be here in 10 years?
A: Vendors that can focus on their customers through direct service and support.

Q: What competitors do you worry about most?
A: All of them.

Q: Other than Cabletron, which network company has the best CEO?
A: It's too hard to pick.

Q: What do you consider your greatest achievement?
A: My family.

Q: Who is your favorite author?
A: P.J. O'Rourke.

Q: Which living person do you most admire?
A: Bob Levine. [Yeah, right. . . .]

Q: If you were to pursue another career, what would it be?
A: Cowboy, fireman or astronaut.

Reed Hundt
Chairman, FCC

Q: The new telecom law promises deregulation but seems to give the FCC more work, not less.
A: The new law envisions a dramatically more competitive telecom marketplace, and the FCC is directed to make that happen via dozens of proceedings. Over the long term, we can let competition replace most regulation.

STAN BAROUH

Q: Can corporate users participate in reform?
A: They need to let us know their hopes and concerns as we set the competitive framework.

Q: What is the biggest change the law has brought about for the FCC?
A: We will no longer be administering the boundaries of a feudal regime that separated long distance from local from international from cable from wireless but will be seeking to facilitate competitive battles among some of America's most technologically adept and financially powerful companies for the benefit of customers.

Q: Does the new law leave states with more or less regulatory influence?
A: The states are important partners under the new law, and I will continue to work with and learn from the state telecommunications leaders.

Q: What is the earliest we can reasonably expect an RBOC to meet the competition checklist that will free them to offer long-distance service?
A: We will ensure that the FCC's processes don't cause a lag, but the statute sets requirements that must be met. Ideally, an RBOC would gain support from the states and the Department of Justice, both of which will advise the FCC.

Q: What will Judge Greene do with his spare time?
A: I'm sure he has plenty of things to do, but he is likely to savor the increased competition accelerated by his critical role in the AT&T antitrust case.

Q: What role do you see for the FCC in regulating the Internet?
A: The Internet falls into the category of "enhanced services" that we do not regulate.

Q: Where do you stand on auctioning off toll-free 888 vanity numbers?
A: The FCC does not have the authority to auction 888 vanity numbers.

Q: Does the telecom law offer enough protections so we won't return to the days of single-carrier dominance through acquisitions and mergers?
A: The act, in conjunction with existing law, provides sufficient authority to prevent market dominance that was not earned in the marketplace.

Q: When will we see markets regulate rates?
A: I hope soon, because the work we're doing now to ensure that competition replaces regulation. The need for an FCC will not disappear, but its responsibilities will be different. We will focus on the rules to ensure fair competition and to prevent consumer abuses.

Michael Zisman
President and CEO, Lotus Development Corp.

Q: Will groupware still be a stand-alone product in the year 2001?
A: Actually, groupware has never really been a stand-alone product. Groupware represents a "place" where team members can collaborate using information gathered from a variety of sources. This will probably still be true in 2001.

Q: Where in the network will the basic collaborative computing capabilities reside in the year 2001? In applications? Operating systems?
A: One encouraging aspect of the Internet and the Web is that the protocols, not the platform, reign supreme, at least for now. Collaborative computing relies on a number of services — shared data, distribution, messaging and directories, application development and security. In the long term, these services will be found in protocols, regardless of platform, on top of which innovative vendors will add value.

Q: Will messaging still be the most critical groupware/Internet/intranet application in the year 2001? If not, what will be?
A: I don't see messaging as a stand-alone technology with infrastructure apart from the rest of an organization's infrastructure. Messaging is critical for interpersonal communication and is even more valuable when well integrated with the rest of the business activity happening inside and between companies. So messaging will still be critical, but not in the way suggested by the question.

Q: How will the Internet change your professional life?
A: It will dramatically extend the reach and impact of anything that I am able to achieve.

Q: Which vendors will be the top three players in the collaborative computing arena 10 years from now?
A: I run one of them. Your guess is as good as mine who the other two will be.

Q: When pondering the future of networking, what is your greatest fear?
A: One of the only constraints of sophisticated network-centric applications is limited bandwidth, which we all assume will improve and improve quickly. If that assumption proves false, we're all in for a lot of rethinking.

Q: If you were to write a book about the future of computer networking, what would you call it?
A: *The Face of Computing.*

Q: If you could trade places with anyone in the computer industry, whose seat would you take?
A: The Internet.

Q: You're stranded alone on a desert island with your laptop. The computer gods grant you access to three Web sites. Which do you choose?
A: The Web sites of my three kids.

Q: Which part of the computer net is most like you?
A: The messaging switch, of course. ■

When Chiquita needed superior installation and customer service, we were ready for the call.

As the world's largest banana grower saw business ripening in Europe, it chose the telecommunications company that could help reach new markets with speed and efficiency. To open Chiquita's office in Geneva, Swiss Telecom streamlined the process to a matter of weeks, providing soup-to-nuts consultation. "At every level they offered a 'customer first' orientation," said C. Richard Keener, vice president of Information Systems. "It has been a totally positive experience."

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Networks that run like clockwork.

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What's in store fo Networkin

ExecutiveBriefing

Mark Ascolese
Senior Vice President
Excide Electronics Group, Inc.

Accessible, reliable information is growing in strategic importance to businesses worldwide. Sophisticated high speed processors, vast information networks, and a growing intolerance for systems downtime are producing new demands for the availability and manageability of high quality power. Businesses of tomorrow will be purchasing more than hardware and software, they will be purchasing enterprise-wide network reliability.

William Schrader
Chairman, President and CEO
PsiNet, Inc.

The Internet will support key multimedia applications like voice videoconferencing, live audio feeds, real-time video and interactive gaming. Telecommuting will stimulate industry growth, as will communications, education, recreation and business applications.

Alan T
VP Sales & M
UUNet Tech Inc

Ed Kennedy
VP Worldwide Marketing and N.A. Sales
Dynatech Comm.

As wireless technology matures greater bandwidth will be available to users combining classical telephony with enhanced communications services. Printed literature will decline as readers become accustomed to multimedia interactivity on the Net-based information. Corporations will view large centralized real estate holdings as being obsolete as users get the same networking capabilities at their home or remote office environments.

Richard M. Moley
Chairman, President and CEO
StrataCom, Inc.

It's next to impossible to imagine what's in store for networking in the next millennium. Networks as we know them today probably won't even exist. Almost certainly there won't be wires carrying our voice, video and data. Instead it will be light and the radio spectrum. Every form of communication imaginable, and even those we can't imagine, will be waiting for us in seconds after we request it. It's hard to believe that all of us will wear Dick Tracy watches but that's where we're headed. Optoelectronics will advance to such proportions that electrical communications will be remembered just as we think of the telegraph today.

R
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Netw

Charles S. Strauch
Chairman and CEO
PairGain Technologies, Inc.

PairGain designs, manufactures and markets digital subscriber line (DSL) based systems that allow telecommunications carriers and organizations with private communications networks to more efficiently and quickly deploy high-speed data, video and voice service to end users over the existing infrastructure of ordinary copper telephone lines.

10 YEARS NetworkWorld

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nment.

Hung Vu
President
Milkyway Networks, Inc.

Networking in the next millennium will literally take us into the realm of the Milkyway and beyond. Tremendous increases in the volume and types of information going across the Internet and intranet, and the distances traveled, will create an even greater need for strong security solutions than exist today.

Scotty R. Neil
President
AT&T CommVault Systems, Inc.

Networking in the 21st century will strain resources and test resourcefulness. Reliability will be key. Expanding system complexities will challenge us all, and therefore, users will seek out experienced technology partners who offer efficiency, flexibility and comprehensive solutions. A breathtakingly expanding quantity of data will result in a greater emphasis on information and storage management.

ExecutiveBriefing

the next Millennium?

e Access connectivity will
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remote access unneces-

Bert Whyte
President and CEO
Advanced Computer Comm.

ACC's networking expertise solves the needs of remote, internet and telecommuting access.

ACC offers a full internetworking capability for leased, Frame Relay, X.25, ISDN, and ATM networks. With partners worldwide ACC provides users with easy to use, cost-effective, and reliable networking solutions.

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Richard Faletti
President
Multimedia Comm. Sys., Northern Telecom (Nortel)

The true Multimedia Call will become the standard way we communicate. Whether the network connection is wired or wireless, the Multimedia Call will offer that essential, complete mix of voice, image and data, and it will be as easy to make — and as reliable, affordable, and secure — as voice call is today.

Richard S. Gilbert
President
ADC Kentrox

New network applications, ranging from personal communication systems to interactive television, will increase bandwidth requirements by an order of magnitude. This ensures that all network infrastructures will rapidly migrate to utilize broadband technologies including: ATM, ISDN, and ADSL.

Randy Phillips
President
Ascom Timeplex

Networking into the millennium will offer a bewildering range of services. Users who succeed will take control and negotiate optimum services for each segment of their network creating their own virtual POPs. Total-solution companies like Ascom Timeplex will provide mix-and-match flexibility ensuring the most efficient, cost-effective communications for the future.

WHERE THE SMART MONEY IS GOING

Ten network companies that analysts say are worth investing in for the next 10 years.

By Ben Heskett

Figuring out how to invest your company's money in the latest network technology might be nerve-racking. But purchasing stock in a network company with your own hard-earned cash is another matter altogether.

While technology stocks have sparked more than a few market shock waves over the past year, overall, the stocks continue to perform well. An index of 201 technology stocks compiled and tracked by Robertson, Stephens & Co. grew 45% from 1994 to 1995. The stocks for communications equipment companies rose 56% during that period, and software company stocks grew 64%.

"This is a spectacular market to invest in, especially the communications sector," says Paul Johnson, a vice president at Robertson, Stephens. "The market grew 50% last year, will grow 40% this year and 30% the year after that. Drivers are network upgrades, remote access and the Internet/intranets."

Safe bets

The safest bets in the network industry are the infrastructure companies, analysts say.

Where there are networked PCs, servers and switches, there will be microprocessors. And since **Intel Corp.**'s dominance of the microprocessor market is even greater than **Microsoft Corp.**'s hold over the operating system market, it doesn't appear Intel is going anywhere anytime soon.

We'd also suggest investing in **Cisco Systems, Inc.** and **Cascade Communications Corp.**, companies whose products are being used to build corporate networks as well as the foundations on which Internet and telecommunications services are deployed.

A report from brokerage Salomon Brothers, Inc. says "Cisco is the best positioned vendor in the data networking marketplace," with its strong standing in routers, switching and Internet equipment.

While infrastructure usually brings to mind hardware, several software offerings also can be considered core net technologies, most notably Microsoft's Windows product line. Stock price increases of 52% and 44% in 1994 and 1995, respectively, make Microsoft hard to pass by.

The core software component of the client/server network infrastructure is the database, and there is a handful of good stock picks here, the best of which may be **Informix Software, Inc.** The quiet company's acquisition of Illustra last year is making Informix look particularly good, enabling it to get to market quickly with a universal server for handling relational and multimedia content, such as World-Wide Web pages.

Risky business

What would a stock portfolio be without risk, without the possibility of striking it rich with a rising star?

Analysts say **Xylan Corp.** could be just such an investment. Fresh off a March 12 initial public offering (IPO), the Ethernet and ATM switch vendor is riding high. Its stock opened at $26 and closed at $58 in one of the most successful IPOs ever.

One other potential upside of Xylan is that the company has to be drawing some interest from the leading internetworking vendors, most of which have been paying a premium for companies with technology they need. If Xylan were to be acquired, it could result in an instant stock price ascent.

Vendors of products such as LAN management tools, remote access gear and SNA/LAN integration tools are also attractive acquisition targets and possibly attractive stock picks. Among the best LAN management companies is **McAfee,** which has a market capitalization of more than $1 billion.

Among the riskiest but most popular areas of the network market in which to invest are the telecommunications and Internet sectors.

It used to be that the telephone companies were th most predictable and boring stock picks around. But the Telecommunications Act of 1996 is changing all that. With AT&T breaking itself in three and the Baby Bells starting to unite, it's tough to say what's a good telecommunications stock pick today.

MFS Communications Company, Inc., for example, has been waiting for Congress to open up the local exchange market for years. Now it's in a good position to grab new business with fiber-optic networks installe in major cities across the nation.

Just because the Internet is a risky place to buy stoc picks, investing in it won't be nearly as easy as surfing the Web. Ted Julian, research manager for Internet commerce at International Data Corp., a consultanc based in Framingham, Mass., recommends putting your eggs in several baskets. By spreading your resources across the Internet spectrum of Web secur companies, commerce-oriented companies and soft ware providers, for instance, you cover yourself again the ever-changing nature of the Web.

"You kind of have to watch [Internet-based comp nies] with your stopwatch," Julian observes, noting how quickly companies pushing Internet products take off.

Our two picks here are **Netscape Communications Corp.,** which seems like it must have a few more tricks left in its bag, and **Sun Microsystems, Inc.,** the leading Internet infrastruture provider to date. ■

TOP TEN COMPANIES TO INVEST IN

Company	Revenue	Earnings	Market capitalization (stock price multiplied by number of outstanding shares)	52-week high	52-week low	Current pri
Cascade	$135 million	$25.4 milllon	$3.8 billlon	90	20 1/4	89 3/4
Cisco	$2 billion	$421 million	$26.5 billion	51	17 11/16	46 3/8
Informix	$709 milllon	$105 million	$4 bllllon	36 3/4	16 9/16	26 3/8
Intel	$16.2 billion	$3.6 billion	$50.5 billion	78 3/8	41 1/2	56 7/8
McAfee	$90 million	$14.9 milllon	$1.25 billion	65 1/4	18	54 3/4
MFS	$583.2 million	-$268 million	$4 billion	68	28 3/4	62 1/4
Microsoft	$5.9 billlon	$1.45 billion	$60.8 billion	109 1/4	68 3/4	103 1/8
Netscape	$40 million	$2.36 million	$1.7 billion	87	22 7/8	41 1/2
Sun	$5.9 billion	$355.8 million	$8 bllllon	57 1/8	16 15/16	43 3/4
Xylan*	$30 million	- $9.4 million	$2.24 billion	60 1/2	51 1/4	52

Stock prices and 52-week high and low as of close of the market March 29.
Revenue, net income and market capitalization based on information from each company's fiscal year 1995.

*Xylan issued an initial public offering in March 1996

Link to Network World Fusion to get financial information on our 10 top picks, from a year's worth of stock performance to annual reports. Select then to Inve
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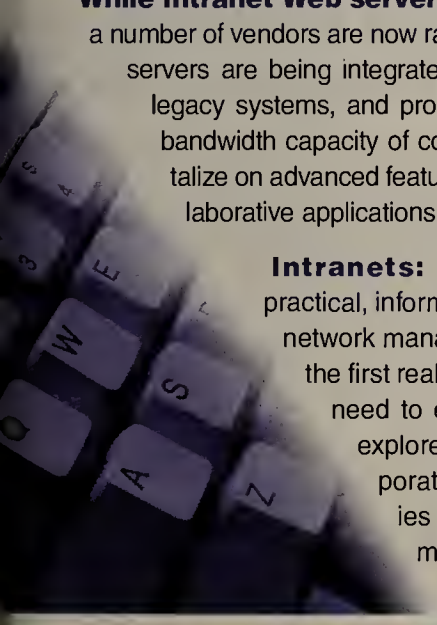
Intranets: TECHNOLOGIES, TOOLS & STRATEGIES

MAXIMIZE YOUR CORPORATE INFORMATION RESOURCES

What do DHL, Northern Telecom, and Ford have in common? The answer is Intranets. They are among the scores of companies of all sizes who have discovered the potential for an Intranet—an internal management information system based on Internet technologies. Intranets change the way we think about information access and distribution as well as transform network infrastructures.

According to International Data Corporation (IDC), Intranets are growing faster than the Internet itself. The number of Intranet Web servers now comprise 55% of total internet servers and are expected to nearly triple in size this year to more than 200,000 and to exceed 4.5 million by the year 2000.

While Intranet Web servers today act mainly as document publishing systems, a number of vendors are now rapidly extending their functionality. For example, Web servers are being integrated with databases, linked to mainframes and other legacy systems, and providing workflow services. Combined with the high bandwidth capacity of corporate data networks, your organization can capitalize on advanced features such as real-time audio and video as well as collaborative applications and 3-D data representation.



Intranets: Technologies, Tools & Strategies is a practical, information-packed one-day seminar which offers you, a network manager, business strategist or corporate technologist, the first real opportunity to gain the insight and information you need to effectively leverage Intranet technologies. You will explore the leading and emerging tools which bring corporate Intranets to life, analyze current user case studies and learn how to implement a strategy for maximum corporate impact.

10 BENEFITS OF INVESTING A DAY AT THIS SEMINAR . . .

1. **Gain detailed insights about the integration of corporate databases and other information sources with Intranet services**
2. **Explore the range of tools available for building, managing and using Intranets**
3. **Ensure that you make the right decisions about security on your Intranet including where and how to implement firewalls**
4. **Explore information publishing on your Intranet at the corporate, group and individual levels**
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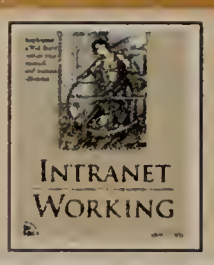

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Digging through th

RECOUNTING NW'S 10 MOST IMPORTANT STORIES

By John Cox

December 11, 1989

Lotus looks to LANs with groupware tool

Lotus Development Corp. unveils Lotus Notes, the product that put groupware on the corporate computing map. Notes let networked users create, manage and share databases of documents, electronic mail and just about everything else they couldn't stuff into a relational database.

This story is still something of a work in progress, as the future of Notes is now being questioned: Will the omnipresent delivery system and user interface created by the Internet and World-Wide Web provide an alternative to Notes? Stay tuned.

January 14, 1991

3Com bows out of the LAN software mart

Conventional wisdom said, "The future is software." But 3Com Corp. CEO Eric Benhamou ceded the LAN Manager network operating system to Microsoft Corp. and jettisoned its workgroup software products. 3Com refocused on its bread-and-butter network adapter cards, hubs and other connectivity devices. The scheme worked because it became clear that for software to do really interesting stuff, it needed hardware connections.

March 28, 1994

Novell bets big on applications

This is the kind of spectacular, expensive failure the industry loves because it makes everyone else look smart. Novell, Inc.'s then-CEO Ray Noorda shelled out $1.4 billion for WordPerfect Corp. and $145 million for Borland International, Inc.'s spreadsheet business (raised eyebrows). The idea: "Add value" to its NetWare franchise with applications and tools (skeptical snickers); in other words, compete with Microsoft (knee-slapping guffaws). Last year, new CEO Robert Frankenberg sold both companies, and so much else, for a fraction of what Ray paid.

November 18, 1991

AT&T to air frame relay service strategy

Rival carriers had jumped into frame relay service first, and analysts wondered if AT&T was serious about this market. It was: Using proven technology and feeding a boundless corporate appetite for more bandwidth, AT&T's frame relay service was hugely successful and, to a large extent, legitimized the then-nascent frame relay market.

July 11, 1994

Wellfleet and Synoptics plan blockbuster merger

The merger of router vendor Wellfleet Communications, Inc. with switch-and-hub builder SynOptics Communications, Inc. was a Big Deal: market leaders, a billion-dollar firm, sparking ongoing industry consolidation, all that pinstriped suit stuff. But really it was about the Holy Grail of networking — seamless connectivity. Corporate users want both switching and routing technologies, they want interfaces, they want integrated net management. So take routers, add a splash of switches, stirred not shaken, served straight up with a twist.

December 10, 1990

Router firms to support SDLC traffic

This story detailed the advent of Synchronous Data Link Control protocol tunneling, the first step in enabling network managers to merge their massive SNA nets with burgeoning LAN internet backbones.

The demand was so intense it even spawned companies such as Sync Research and NetLink Communications devoted solely to this issue.

With IBM mainframes still essential to corporate computing, and LAN internetworks still spreading like wildfire, the importance of this story continues to grow.

October 5, 1992

Start-up targets FDDI speeds for Ethernet

A few techies were thinking out loud, saying, "If Ethernet is good, why can't it be fast?" So they formed Grand Junction Networks, Inc. and whipped up a technology for running data at 100M bit/sec over your vanilla IEEE 802.3 Ethernet. And, since they were off the map anyway, they did it over unshielded twisted-pair wiring instead of the fiber cable needed by FDDI. Voila! A new technology craze — Fast Ethernet — was born. This was something that any executive who ever lusted for a car with a honking V-8 could understand: Faster is better.

September 12, 1994

Start-up offers new tools to do business on Internet

The start-up was Mosaic Communications Corp., now better known now as Netscape Communications Corp., after its hugely successful Netscape Navigator World-Wide Web browser (a term not used in the original story — what did we know?). The new tools were server-based applications for handling Web documents and for adding security features to protect transactions. In the 18 months since then, Web browsers and Web protocols have become almost de facto standards for giving users access to vast amounts of information and, increasingly, to corporate applications.

May 31, 1993

It's here: Long-awaited Windows NT takes a bow

With this release, Microsoft Corp. stopped being corporate America's chief supplier of such mission-critical applications as Flight Simulator. The 32-bit Windows NT "network aware" operating system signaled just how serious Microsoft was about building the basic client/server infrastructure for the next generation of networked applications.

February 5, 1996

Let the competition begin!

The U.S. Congress rewrites the 62-year-old law governing telecommunications and, finally, passes a new one. Ultimately, the law will mean some big changes. But let's be honest: The real fun will be watching the telecommunications companies jump, Rambo-like, into the knife fight known as "free market competition."

NW story archives

GUILTY AS CHARGED: THE 10 STORIES WE OVERHYPED MOST

By Paul Desmond

May 26, 1986

Wang devours Intecom

One of the central tenets of the "office automation" movement of the mid-1980s was that PBXs would play a role in linking desktop automation devices. Wang was so sure of it that it plonked down $156 million to acquire switch maker Intecom, and IBM bought Rolm two years earlier. Start-ups CXC Corp. and Ztel, Inc. had pulled together millions in venture capital and were rushing so-called fourth-generation switches to market.

The market summarily thumbed its nose at the idea of switching data via PBXs. Wang ultimately sold Intecom, IBM ditched Rolm, and Ztel and CXC faded away.

December 1, 1986

TCP/IP faces user scrutiny, competition from OSI model

We admit it. We wanted OSI; we wanted it bad. We didn't trust TCP/IP. It was too simple and dirty; it couldn't possibly work. OSI was squeaky clean and oh-so-wonderfully complicated. That probably explains why the government liked it so much.

We're sorry. We know better now. "Bad OSI. Bad."

May 1, 1989

SAA lineup means new game plan for IBM users

Oh, to be a fly on the wall when IBM conceived Systems Application Architecture. "OK, new game plan. We have this cool graphical interface, see? We use it for everything — mainframes, minis, PCs — doesn't matter. We come out with a few apps. Start with a big, expensive, complicated one — does everything you can think of. We give it a snappy name. What? Yeah, yeah, OfficeVision, something like that. We slap the GUI on it, see? People will eat it up, right?"

Wrong.

February 25, 1991

User, vendor camps rally to boost ISDN

We thought this ISDN love-in was just the ticket to jump-start the already-maligned ISDN market. Users, vendors and carriers gathered to pledge allegiance to a bevy of Bellcore specs — dubbed National ISDN 1 — aimed at promoting ISDN interoperability. All the big guns were there — GM, Kodak, AT&T, IBM, Northern Telecom and the rest. The day of ubiquitous ISDN service couldn't be far behind. Oh, happy day.

It's not that we were wrong, exactly; we were just ahead of our time. Yeah, that's it. You'll see. It'll happen.

March 11, 1991

IBM extends APPN to OS/2, 3174 devices

Think of this as representative of hundreds of stories we've written on APPN, often extolling the day when you could just plug a new machine into your net and, presto, it would configure itself and start humming away in harmony with your big iron. The whole thing reached a fever pitch when Cisco got into the act, coming out with APPI — a version of APPN intended to work over TCP/IP networks.

One overblown SNA networking scheme proved to be enough, and Cisco — with our wholehearted blessing — eventually backed away from APPI.

Meanwhile, APPN still sounds like a good idea, but until we see lots of you voting with your pocketbooks, we'll try to temper our enthusiasm.

April 1, 1991

IBM, AT&T join hands in net mgmt.

It was a big affair held in New York. Arch rivals in the integrated net management arena were burying the hatchet, agreeing to forge links between their systems for the benefit of mankind. IBM's NetView and AT&T's Accumaster Integrator would be on speaking terms.

Actually, it was more than that. It was affirmation that the concept of a manager of managers may actually come to fruition, given that two kingpins were pledging to make it happen.

Of course, it was also April Fools' Day.

September 16, 1991

HP, IBM among winners in OSF management plan

Well, we had that part right — HP and IBM were indeed among the winners in the OSF's ambitious Distributed Management Environment plan; trouble was, you were the losers. DME sounded swell: It would meld best-of-breed technologies for multivendor network management into a coherent whole that would make your life wonderful. But it wasn't quite that simple. There was squabbling, infighting. Oh, it got ugly. By the time it all fell apart, we didn't like it anymore anyway. "Bad DME. Bad."

October 7, 1991

Firms plan to jointly build integrated hub and routing tool

It was probably the name. RubSystem? Cisco and SynOptics were asking for trouble. Yeah, yeah, router plus hub makes rub. We get it. But it was just too silly to succeed. Can you imagine a multimillion-dollar line item on your budget for the "RubSystem?" The bean counters would think you were running a massage parlor on the side, and you'd be out on your butt, probably facing charges for grand larceny. The RubSystem. Please.

July 5, 1993

Novell grabs tail of development beast

This was Novell's big announcement of AppWare, the application development strategy that was supposed to ...

Oh, who cares what it was supposed to do. AppWare was a disaster. And no wonder. Who understood it? We talked to lots of people: Novell execs, analysts, users, our spouses, children, pets. No one could really explain it. We wrote lots of stories, but we never felt good about them. So we talked with more Novell execs. They came to our headquarters. We asked questions. They sort of answered. We drew pictures. They weren't pretty. Eventually, we thought we sort of got it, but we really didn't.

Apparently, you didn't either, so Novell finally sold AppWare. Good riddance.

July 18, 1994

Messages waiting: Vendors at work on a universal in-box

Keep workin'.

Follow the LEADERS

TEN YEARS OF USER excellence AWARDS

Past User Excellence Award winners refine the infrastructure, looking to a future filled with network applications.

By Charles Bruno

Scott Andersen has built a career out of designing and erecting wide-area backbone networks. Yet the director of technology for Hyatt Corp.'s Regency Systems Solutions foresees the day when network applications will chew up the majority of his time.

"Java wouldn't have the head of steam it has if people weren't thinking along the lines of network-centric applications," Andersen says. "All the infrastructure stuff is moving to a commodity level, and it's the network applications that will emerge as the corporation's strategic assets."

Nowhere is evidence of that trend so clear as with past winners of *Network World's* User Excellence Award. Companies such as American Airlines Decision Technologies, Inc., American Express Travel Related Services Co., CS First Boston, Florida Power & Light (FPL) and the Medical Center of Delaware (MCD) all have launched their own initiatives to drive network-centric applications.

Meanwhile, companies such as Ford Motor Corp. — which has long embraced network applications, including electronic data interchange — are working diligently to forge "supplier-customer teams" to extend those suites to key business partners.

"We're always looking for ways to fine-tune the underlying network to make [everything] run much more smoothly."

Roger Thibodeau

STAN GODLEWSKI

In parallel with the application efforts, companies continue to evolve their award-winning enterprise nets, learning valuable technology lessons along the way. In the wide area, organizations seem to have rallied around frame relay. And in campus networks, User Excellence Award winners have embraced client/server computing, bowed to the influence of the IP protocol stack and deployed legions of routers, LAN switches and even Asynchronous Transfer Mode products.

"Everyone has the tools available to them," says Neil Flynn, director of telecommunications and technology at FPL. "What's important is how you adapt them to meet the business needs of your end users. I don't want to underestimate how we will use these technologies to a competitive advantage."

Seeing the light

FPL is entering into a new competitive landscape due to deregulation in the electric utilities industry. It will need to be more responsive to market needs and move quickly to beat competitors to the punch with advanced services.

"We're aiming to develop applications with more flexibility," Flynn says. "We've got to find quicker and less expensive ways to develop and deploy net services on a local, regional and statewide basis."

That means FPL will be distributing more applications out to the wide base of LAN-attached PCs that has sprung up over the past 10 years — quite an about-face for a company that has relied so heavily on host-centric computing.

Transporting data between the statewide LANs will not be a problem because FPL has extended the reach of its own private fiber network that runs on territorial rights of way. The company now has about 700 miles of fiber cable strung across Florida — basically up and down both coasts, and as far north as Sanford, northeast of Orlando. Voice, data and video feeds dance along the OC-48 pipe, which has more than doubled in length since 1986, when it helped FPL earn its User Excellence Award.

"Not only have we been able to reap considerable savings by replacing dedicated phone lines, but the fiber net has allowed us to deploy new applications like videoconferencing, which has been a boon to our organization," says Everett Stonebreaker, supervisor of voice and radio communications.

Legacy links

Maybe FPL can learn a lesson in network application development from 1990 User Excellence Award winner American Airlines Decision Technologies, which is reaping the rewards of streamlined software development.

"Two and a half years ago, [replication] technology didn't exist. The question is, can it handle the volume? We're looking into that now."

Joe Rappa

The company, now known as SABRE Decision Technologies, earned the award largely on the strength of QIK RES, a front end to the SABRE reservation network that increased call-center agent productivity by 7%. That translated into a labor savings of $9.1 million and a $5.2 million reduction in voice communications expenses in the first year.

The company has never looked back. QIK RES has turned into the QIK ACCESS family of products that some 30 airlines worldwide now use to front end their own reservation systems, says Larry Browder, senior development director.

To reach that point, SABRE Decision Technologi had to adapt its applications to work with a variety of hosts. "We definitely have learned over the last six years to structure our code so that we isolate the [implementation-specific] items from the code tha be the same across the board," Browder says.

The company then develops an API to link its generic code to the specific mainframe gateways use by a given client; it has about 30 such APIs to date.

When it won the award, SABRE Decision Techno ogies was on the leading edge of client/server netw ing. The company hasn't lost that client/server

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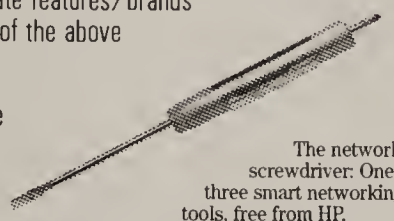

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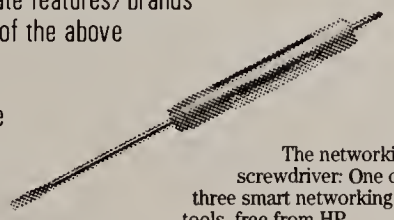

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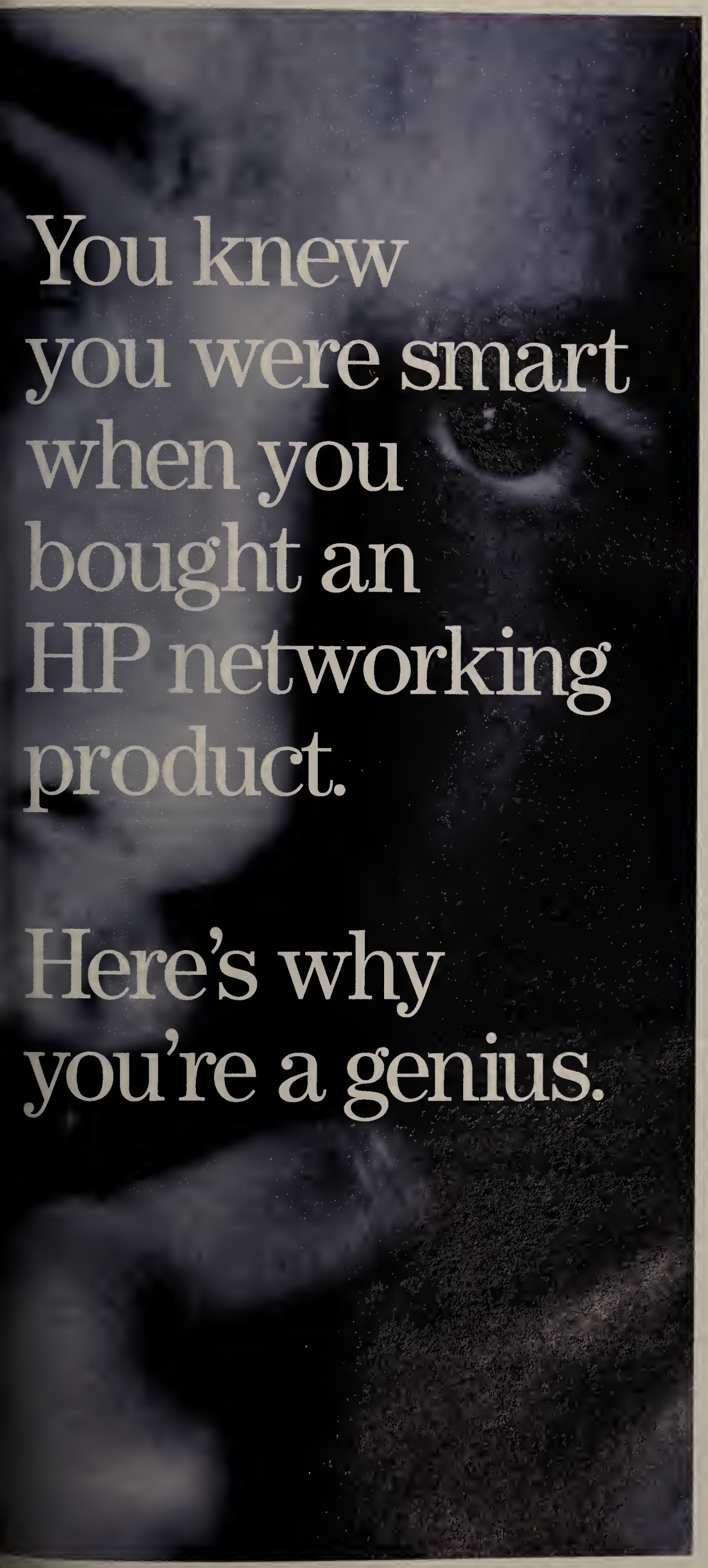

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religion and is looking to push the envelope in areas such as distributed databases. QIK ACCESS products already work with a variety of SQL databases running locally in various reservation centers, airports, travel agencies and the like, but that's not enough.

"Airlines have many different reservation centers, so the challenge is trying to expand the use of local databases and any type of distributed processing so that [the same data] can be used by multiple centers," Browder says. This gets into such things as replication over the wide area, the type of problem SABRE Decision Technologies expects to confront going forward.

Replicating success

CS First Boston, the New York investment banking house that won a User Excellence Award in 1993 for its Front Office/Back Office Link (FBLink) application, already has conquered the data replication climb.

FBLink is an asynchronous message queuing middleware product that seamlessly links traders' desktops with back-office processing systems. But since the time of the award, CS First Boston has created a distributed data management architecture to move updated host data down to local decision support data warehouses.

FBLink was key in developing what CS First Boston calls the New Trade Processing Architecture (NTPA), which lets applications on Unix workstations work seamlessly with mainframe-based clearance, settlement and accounting systems. Because FBLink is two-way, once the DB2 host databases are updated, the newest information can be pumped back down to traders on local networks.

Two related changes have helped to refine the net, says Joe Rappa, directory information services technology engineer. First, NTPA is being extended globally to create a single integrated back office for all CS First Boston trading regions. So far, NTPA now embraces Europe as well as North America.

Second, the company last year began deploying an enterprisewide, decision support data warehouse. The warehouse consists of DB2 data that is replicated to multiple Sybase, Inc. SQL Server relational database management systems on Unix servers. The goal is to give CS First Boston traders anywhere in the world access to the most current trading information.

New Sybase DB2 Replication Agent will give CS First Boston more flexibility in copying data, eliminate the current need for application developers to program replication themselves, and relieve the MIS group of the work — and costs — of building and maintaining infrastructure software, according to Rappa.

"Two and a half years ago, this technology didn't exist," he says. "The question is, can it handle the volume? We're looking into that now."

Massaging data from LANs and host databases may be a top priority at CS First Boston, but other companies are still focused on making sure the existing network infrastructure is sound.

Take the case of Connecticut Mutual Life Insurance Co., a 1993 cowinner of the User Excellence Award. The company deployed imaging as a means of reducing costs and paper shuffling.

It worked. Two years after the application came up, Connecticut Mutual saw a 35% increase in productivity. That was more than enough to offset the $6.5 million initial payout for imaging products and associated gear. And that payback came 18 months after the project began — six months earlier than planned. More importantly, company management points out, the elimination of associated clerical jobs has resulted in an annual cost avoidance of $4 million.

Gaining control

Since the time Connecticut Mutual won the award, it has been busy moving from a 16M bit/sec token-ring campus backbone to a collapsed backbone where 3Com Corp. LinkBuilder hubs feed into the backplane of Cisco Systems, Inc. 7000 routers.

"We went from a relatively unintelligent bridged network to more intelligent routing among manageable hubs on the net," says Roger Thibodeau, assistant vice president.

The structured wiring hubs have enabled the company to implement management down to the port level, where it can isolate a problem and take down the affected portion of the net. That's a big step forward from the bridged environment, where one beaconing station could collapse the entire imaging application.

"Now we essentially lock out beaconing stations immediately so they don't affect the backbone and the application stays up," Thibodeau says. "So even as the applications development levels off, we're always looking for ways to fine-tune the underlying network to make it all run much more smoothly."

Columbia Gas Transmission Corp. also has caught the internetworking bug. Since 1991, the company has rolled out 106 routers to link its Ethernet and token-ring networks. What's more, it is in the process of diverting SNA Synchronous Data Link Control traffic off dedicated leased lines so it can ride with LAN traffic over the router net via Data Link Switching.

The resulting savings are important to Columbia Gas, which late last year emerged from Chapter 11 proceedings. The company has reinstated dividend payments and prospects look good.

Now the company has a more pragmatic outlook on dealing with problems, says Bruce Cavender, manager of network engineering. "Our new CEO, Rick Richard, says, 'If it's not functioning effectively, admit it, fix it and go forward,'" Cavender says.

Switching has also made its mark on 1991 award winner Texas Instruments, Inc. The company is rapidly deploying switched Ethernet to improve performance and network uptime, according to Darrell Thedford, senior network strategist. "We will drive [Fast Ethernet] down to the servers and workstations as demand warrants it," he says. Meanwhile, the company has already deployed ATM among seven sites in the Dallas area as a pilot.

"The primary focus before was within the walls of the enterprise. The most important thing for us now is dealing with the virtual enterprise."

George Brenckle

Outside the walls

Perhaps no other User Excellence Award winner has had to do as much of an about-face with its network as the Medical Center of Delaware. Four years back, the organization gained national attention for its highly integrated network applications and its underlying net infrastructure.

In 1987, with future goals in mind, MCD began to install an enterprise network expected to exceed 3,000 nodes.

The entire IS focus at that time was on integrating host-based hospital management applications with newer LAN-based programs. Now, though, with changes in the fabric of the health care delivery system, the focus is on implementing remote access and mobile computing services required to tie in remote clinics, mobile nurses and health care partners outside the hospital.

"The primary focus before was within the walls of the enterprise," says George Brenckle, director of computer services for MCD. "The most important thing for us now is dealing with the virtual enterprise. We need tools in our box to go outside the walls of this hospital system."

The medical center's network has sprawled statewide, and there are plans to reach nationally to some health care partners, Brenckle says. Now the network staff is busy building a virtual toolbox of remote access services that range from simple dial-up services to ISDN, and even Switched Multimegabit Data Service or frame relay services for certain types of high-bandwidth applications such as medical imaging.

"We're trying to match each user's criteria for bandwidth, usage patterns and locations to the type of services we will roll out to various sites," Brenckle says.

Back to the backbone

One of the most common themes among User Excellence Award winners is the investment they make in enterprise backbone infrastructure. The message seems clear: Before tackling mission-critical network applications, build a highly effective backbone network infrastructure.

Take, for instance, Hyatt's Regency Systems Solutions. At the time Hyatt won the award two years ago, its Regency Systems spin-off was launching an aggressive campaign to significantly upgrade an already large national backbone network.

Now that upgrade is complete. Hyatt has multiple virtual circuits feeding from its Oak Brook, Ill., data center to an AT&T InterSpan frame relay cloud, which connects them to the company's backup data center

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Whatever the case may be, when assembling your entry, please pay attention to detail and be specific. Past winners have been those who did the best job explaining the benefits of their particular network project in terms of cutting costs, improving productivity and the like. We also put a premium on entries that demonstrate an innovative use of technology to contribute to the bottom line.

Your entry may be submitted via the Internet (excellence@nww.com) or by fax at (508) 820-1103. Or mail it to *Network World,* Attn: Special Products Editor, 161 Worcester Road, Framingham, Mass. 01701-9524.

All entries must be received by Aug. 31, 1996, and must include your name, title, company name, address and phone number.

Oh, one other thing: Entries will be accepted only from users. Sorry, but we will not consider entries submitted by vendors or consultants on behalf of their customers and clients.

Omaha, Neb.

"This really gives us a flexible capacity moving forward," Andersen says. The use of frame relay allows Hyatt to scale up its bandwidth as application requirements change. Hyatt currently is running 56K bit/sec circuits over the frame relay net with a 32K committed information rate. Frame relay replaces a gaggle of dedicated 56K links.

And it enables Hyatt to dual-home virtual circuits to its Oak Brook and Omaha data sites. In the event of an outage at the Oak Brook site, data is transparently passed to Omaha without service interruption.

Regency Systems uses Cisco's Open Shortest Path First protocol in its Cisco 7000 routers to propagate routing information between the two data sites.

Like other User Excellence Award winners, frame relay has proven to be a big winner with Hyatt's Regency Systems. "It greatly reduces the infrastructure costs," Andersen says. "We now get our feed from the frame cloud via multiple T-1s instead of a whole bunch of 56K circuits, so [it's] more economical."

Looking ahead

Our 10 years' worth of User Excellence Award winners represent an impressive collection of network knowledge. What, then, do they see as the key issues going forward?

"The infrastructure issues like security, performance and network services are all being solved," according to Andersen. "What's important now is to understand how you're going to use the network investment."

FPL's Flynn agrees. "We really need to make intelligent business decisions to service our customer needs. We need to stay on top of their needs, anticipate them and deliver the types of services they'll require."

Even today, Flynn says, FPL is recognizing the changes in the workforce that will drive the need for greater remote access and mobile computing services in the years ahead. "We need to be there with services before the customer asks," he says.

For other users, such as MCD's Brenckle, bandwidth issues will demand attention. "Our ability to deliver applications will be decided largely on whether we can economically get the bandwidth we need from carriers in the form we want," he says.

First National Bank of Maryland, meanwhile, no longer wants to worry about such issues. The 1990 User Excellence Award winner is thinking about jobbing out First Net operations to an outsourcing supplier so internal IS can focus on network applications issues.

"We're looking for someone who can create the magic to deliver applications so that we may worry about the business needs," says C. Donald Rees II, vice president of network operations. Rees believes that the old model of internal IS operating the network and developing applications is past its prime.

"The bank's needs, the marketplace and the cost models have all changed," he says.

If that's so, perhaps the next 10 years will bear a new breed of User Excellence Award winners — network teams that move their organizations beyond the Internet, beyond traditional LANs and the like to a network world we haven't yet discovered.

John Cox, Paul Desmond, Kathy Scott and Lee Schlesinger contributed to this story.

Check out the full scoop on most of the past User Excellence Award winners via Network World Fusion. Select Tenth Anniversary then User Excellence.

THAT WAS THEN, THIS IS NOW — A RUNDOWN OF OUR USER EXCELLENCE AWARD WINNERS

Year	User	Net accomplishment	Key developments since winning award
1995	Ryder System	Built nationwide frame relay net to support client/server applications that are dramatically improving productivity.	Ryder is now extending its net with Internet links and intranet applications. It is also moving 80 AS/400s from field offices to a centralized location for easier administration.
	Panhandle Eastern Pipe Line (PEPL)	Gas transmission firm uses client/server net to cap runaway costs, reap $4 million savings in 1995 and reduce operating costs over disparate host systems.	An extra $3 million in savings is expected this year as PEPL refines its client/server applications.
1994	Iowa Communications Network (ICN)	Publicly funded, 3,000-mile, 2.4G bit/sec SONET network helps draw businesses to the state and provide distance-learning to students.	The ICN has since helped reduce the gap in government services provided to urban and rural populations.
	Regency Systems Solutions (Hyatt)	Company ousts private-line SNA net, moves to distributed NetWare LANs that ship IP data over frame relay links to a Unix-based transaction processing system. Hotel bookings rose 25%, while reservations costs dropped dramatically; room revenues spurted up 3% due to network-based applications that manage room availability.	Regency Systems has groomed its frame relay net by adding dual homed circuits to its Omaha reservations center, enabling it to act as the data center in the event of an outage to the primary site.
1993	Connecticut Mutual Life Insurance	Enterprise imaging application helped increase productivity 35% and save $4 million through the attrition of clerical jobs related to paper handling.	Connecticut Mutual is now merging with Massachusetts Mutual Life Insurance Co. and meshing both companies' data services, including imaging.
	CS First Boston	Investment banking company develops message queuing middleware that seamlessly links traders' desktops with back-office processing systems.	Has since devised distributed architecture to move updated host data down to local decision support data warehouses.
1992	Ford Motor Co.	Automaker's Direct Data Link network connects its parts suppliers with Ford purchasing and other administrative applications.	Ford has added new applications that exploit the network and extended the net and applications to additional business units.
	Medical Center of Delaware	Health care provider integrates SNA and LANs over a fiber backbone, translating into more than half a million dollars in savings and improvements to hospital services.	The center is now building remote access and mobile computing applications to satisfy demand from new business partners and traveling medical personnel.
1991	Columbia Gas Transmission	Natural gas transporter fighting Chapter 11 bankruptcy invests in a $21 million network upgrade, improving data collection and remote diagnostics.	Financial woes behind it, the company has built a router network connecting 60 NetWare servers over Ethernet and token ring, with a VM/MVS mainframe accessed via DLSw.
	Texas Instruments	Network staff achieves uptime of 99.05% to 99.64% on a 60,000-workstation, 23-mainframe global worldwide network.	Fast Ethernet and Ethernet switching help boost performance of workstations and servers. Company has been piloting ATM across seven sites in the Dallas area.
1990	First National Bank of Maryland	First Net, the bank's private voice/data net, helps cut telecommunications costs by $1.2 million.	The bank is now exploring remote services for banking agents on the move and has issued an RFP to outsource net operations so its IS staff can focus on applications development.
	American Airlines Decision Technologies	Migration of reservation network to client/server model coupled with QIK RES graphical user interface amounts to 7% productivity gain and $14 million in savings in first year.	QIK RES has turned into a family of products – used by some 30 airlines – that now offers productivity gains of up to 20%.
1989	Sears Technology Services	Firm builds SNA network connecting 9,500 Sears stores in eight countries, managed from a single NetView control center.	In 1992, firm announced it was combining with IBM Information Network and IBM's internal network division to form Advantis.
	CSX Technology	Cutover of 4,000-mile private fiber backbone saves $12 million per year and supports centralized net strategy that is crucial to boosting customer service.	Telecommunications services and operations have been outsourced to AT&T; company is moving to distributed computing architecture and increasing use of wireless technologies.
1988	American Express Travel Related Services	Amex creates sophisticated global SNA data network to support its core credit card business, including links to clients inside and outside the company.	The network has matured with interconnection of PC LANs, and the company has increasingly relied on distributed application servers.
	Bechtel Group	Deployed DECnet protocols networkwide to support about 50 distributed LANs linked via 56K bit/sec point circuits to a dual host data center in San Francisco.	Company has since migrated to IP to unite Bechtel offices with suppliers and clients, and is moving to Windows NT LANs. Frame relay and VSAT links have replaced the dedicated circuits. Only one host application remains; others now run in client/server mode.
1987	Unified School District 259 of Wichita, Kan.	School district drives down costs by building a T-1 microwave net linking 110 schools and administration buildings.	The net will eventually enable network applications to be accessed from student workstations.
1986	Florida Power & Light	Utility builds private 200-plus-mile fiber-optic network that carries voice and data, effectively bypassing the local telcos across the state.	Network now runs more than 700 miles up both coasts; the company is looking at using the net to offer services to state businesses.

On the road to A BLISSFUL NET

Ten political, regulatory and technical milestones mark the route to future networking nirvana.

By Jim Duffy, David Rohde and Peggy Watt

Ever see one of those ads that compares the wonderful world of distributed computing today with the slow, clunky dumb-terminal world of yesteryear?

Ever say to yourself, "Well, if things have improved so much, why is my job still so darn difficult?"

Let's get real. Ten years from now, you'll likely look back on these days and groan. You'll remember an awful era during which network management was still a grab bag of piecemeal installations, vendors pushed proprietary virtual LANs (VLAN), object-oriented tools took years to master, directories were a joke, phone companies raided your budget for a wideband connection and voice communications remained a world apart from data.

In 2006, the networked world will hopefully be a much different place than it is today. But what changes lie down the road? Here's a look at 10 political, regulatory and technical milestones that must be achieved if we're ever to reach networking nirvana.

Network management

For starters, network management vendors need to make their software more flexible and intuitive. Adoption of a common interface and programming language — say something like a World-Wide Web browser and Sun Microsystems, Inc.'s Java, respectively — could open the door to the long-elusive interoperable management applications.

With new Internet technologies, management information can be easily stored on Web servers built on a variety of platforms and accessed through Web browsers on a range of clients. Meanwhile, if those management applications are written in the Java language, companies can use the Internet or an intranet for passing information among the applications.

Ease of use will be a big factor in Java and the Web's acceptance among the network management elite.

"Number one, it's simple. Number two, everyone knows how to use a Web browser," says John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo. "Third, it does not require a common database schema or a common repository."

Once applications and tools can easily share data, users will be able to write automated routines, rules, script files and templates that encompass knowledge from past management experiences. With these routines, network managers will be able to establish policies that give products such as LAN probes and analyzers, Simple Network Management Protocol management platforms, systems management applications and mainframe-based operations management applications enough intelligence to make remedial decisions.

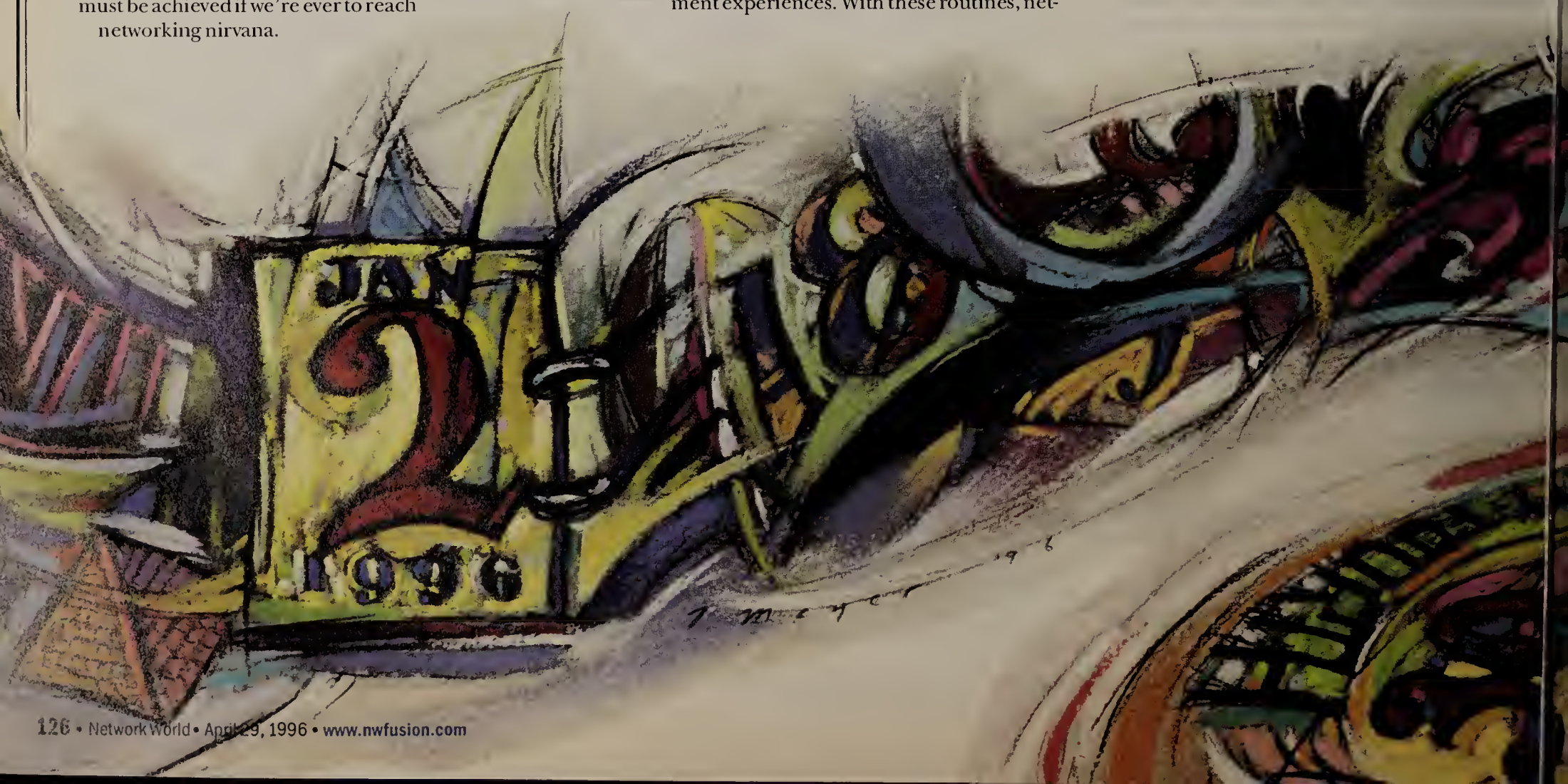
Applets

Another milestone also centers on Java. Software vendors have to deliver on the applet idea to truly harness the potential of interactive functions capable via the Web.

Sun needs to continue to refine and license Java widely so it can be the standard means of application communications. And Microsoft Corp. needs to implement its Jakarta — Visual Java — soon and make it widely available so others can take advantage of that incarnation.

Microsoft also needs to deliver ActiveX, its object-based Web application architecture.

Sun will need to make some effort to ensure that Java continues to work with Microsoft's tools so developers have a range of options. The Web presents a ripe opportunity for new application development, and Java can be the tool of choice for that if Sun continues to enhance and supplement it.



ORKED FUTURE

Microsoft's OLE

Another milestone will occur when Microsoft delivers all the pieces of its broad OLE plan. It needs to follow through on development of a graphical, object-oriented operating environment; the seamless integration at the directory level with other operating systems, notably legacy ones such as Novell, Inc.'s NetWare; and broad accommodation of alternative interfaces, such as voice and other sensory input.

To create this rosy scenario, Microsoft must deliver its Cairo operating system on time in 1997 and then stay on track with subsequent, increasingly sophisticated releases.

The operating system and graphical interface are already melding. Soon Microsoft needs to blend the operating environment and the desktop management tools, probably starting with the Web browser but extending to — roughly in this order — electronic mail and messaging, group collaboration tools and databases.

Other vendors need to fully embrace object-oriented technology, too. "Software development standards are hugely important," says Mark Gibbs, an independent consultant in Ventura, Calif.

Directory services

Perhaps led by Novell with its Novell Directory Services (NDS), vendors need to make their directories real and interoperable, primarily by fully embracing X.500 and its directory synchronization protocol. Among the challenges are universal name resolution across multiple name spaces, master directory creation for management and links to public and private directories, with security.

Novell also should hurry with its promised support for X.500 standards such as the Directory Access Protocol for server-to-server communications, the Lightweight DAP for server-to-client ties and the Directory Service Protocol, which synchronizes separate directories. This should be extended to synchronize the name spaces of other vendors' NOS products, such as Windows NT and even Lotus Development Corp.'s Notes.

"Domain name servers are creaking and groaning at the seams, and X.500 is the sledgehammer needed to crack this nut," Gibbs says.

Novell also needs to proceed quickly with announced plans for enhancing NDS and for NetWare clients to be able to access two NDS trees — an internal corporate tree and an external public directory — at once. It also needs to hustle on its promising technology called federated partitions, which let users share part of their directory with the outside world — say, the Internet —and still keep their internal tree secure.

Desktop quality of service

On another front, router and networking software vendors must universally adopt desktop quality-of-service (QoS) standards. In particular, they need to embrace the IETF's Resource Reservation Protocol (RSVP) so users can better control the transmission quality of their applications.

Adoption of QoS standards goes hand in hand with implementation of high-speed switching technology, such as Asynchronous Transfer Mode, that can accommodate voice, data and video traffic. QoS delivery also depends on advances in mapping today's technology, such as IP routing, to ATM.

"We're not going to have ATM to the desktop in huge volumes," McConnell says. "And even with switching, we still don't have guaranteed [QoS]. I don't know if we can actually get [QoS] to the desktop, but we can get better and better with it. [Desktop users] might set parameters, but there's no way you could guarantee that those would actually be met."

But users could find another path to attain the benefits of QoS. Through APIs, the developer has the ability to manage QoS for you, says Frank Dzubeck, principal of Communications Network Architects, Inc. in Washington, D.C.

"People tend to think of QoS as selecting bandwidth and setting up a phone call. But that's only part of it," Dzubeck says.

QoS also allows a user to make a video call and store it for later delivery if the intended recipient isn't there or distribute a spreadsheet to participants of an electronic meeting. The user could increase bandwidth only while transmitting that spreadsheet, for instance.

It's still a long-term goal, either way. "There is a tremendous amount of little management nuances that are required for implementation," Dzubeck says. "The API structures aren't intimate enough with the bandwidth services to yet provide this capability fully."

VLAN standards

In addition to allowing desktop users to control QoS for their applications, network managers need a way to ease net moves, adds and changes. This is especially important in this era of mergers and acquisitions and the virtual corporation. These trends are making the networking world an increasingly multivendor one, rife with a lot of movement and mobility.

The ability to set up VLANs makes this environment easier to dwell in, but vendors to date have been pushing proprietary VLAN solutions that attempt to lock users into a single product line. Another milestone will occur when LAN switching vendors wholeheartedly adopt VLAN standards and develop compliant products. These standards will encompass VLANs defined by port groupings, media access control (MAC) addresses or network-layer address. They will include methods such as frame tagging, MAC address table lookups or a new addressing method only for switches in VLAN group associations.

"The interesting benefit that we would gain from [the switch addressing method] is now we have a very small set of addresses that we're dealing with, and therefore, we can switch them very, very fast," says Karl Shimada, vice president of market research at Rising Star Research in Boulder.

Voice over ATM

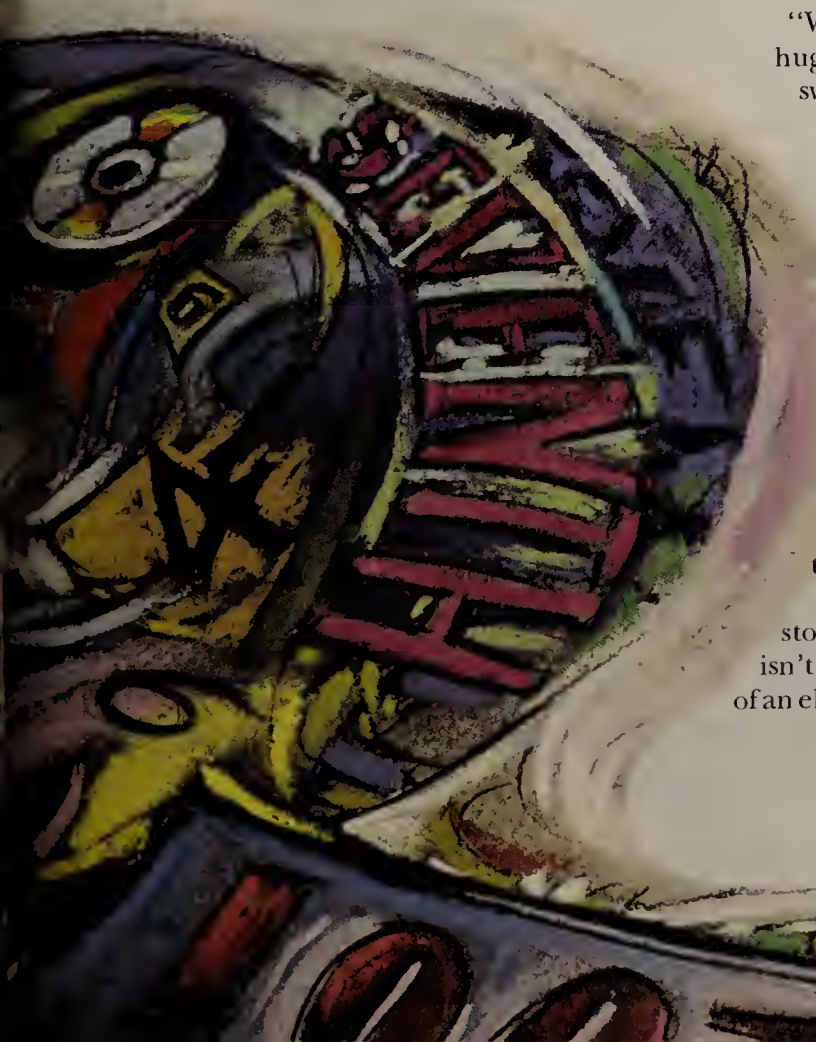
Picture all of ATM's benefits: scalability, flexibility, bandwidth. Now imagine that it does one other thing for users: It saves them a ton of money.

That'll happen over the next decade, provided the industry moves to voice over ATM in such a way that lets users truly interleave voice, data and video traffic in a dynamic fashion, rather than simply offering ATM as a gee-whiz imitation of time-division multiplexing.

Vendors already are moving toward this milestone. Several leading private branch exchange makers already are slated to come out with interfaces that will let users replace voice tie lines with ATM circuit emulation.

This technique uses ATM's constant bit rate class of service to guarantee that the voice connection is not subject to the kind of latency that is acceptable for data applications. But because it forces a constant bitstream onto what is inherently a packet data service, despite the fixed cell length, analysts scratch their heads when trying to figure out the user benefit.

The secret to making voice over ATM pay off is letting it travel over variable bit rate (VBR) connections. This means voice cells find the gaps between file trans-



fers, transaction data and even downloads of Web graphics.

Sound scary? It needn't be. Each of the three vendors now supporting VBR-class voice over ATM — General DataComm, Inc., Northern Telecom, Inc. and StrataCom, Inc. — offers a prioritization scheme that, in effect, treats voice traffic as top dog (or lets you make that determination). Using such features as silence detection, it's only during the natural pauses in speech that the data gates come down and other traffic can flow through.

Not surprisingly, much of users' hesitation so far revolves around standards, or the lack thereof. But as ATM seriously contemplates an invasion of the world of voice telephony, a bigger problem emerges — integrating telephony signaling and the kind of PBX features that everyone takes for granted.

Think of these events in the telephone network: Your company subscribes to a carrier's virtual private network service so you can make a seven-digit call across the country to another office. Or you activate the transfer or conference feature on your telephone set.

They're routine today with conventional telephony. But with a voice-over-ATM implementation, even these simple features are not available in a standard way because the robust signaling of the public network has not been translated to the ATM world. That, in and of itself, is a major challenge for the voice and data networking industries to work on together for the next few years.

Cheap wideband local access

Before the world of interoperable multimedia applications can truly reside on the desktop, the telecommunications industry will have to offer a wideband local pipe to long-distance switches that doesn't eat up the budget. Observers say this milestone should happen within the next five years or so.

"The first and foremost issue for the communications and computer industry has to do with the availability of reasonably — I won't use the word 'inexpensive' because that wouldn't be accurate — priced high-bandwidth access," Dzubeck says. "The need for bandwidth on demand is increasing exponentially, but the cost of bandwidth is still too expensive."

Few observers believe prices are going to crater, even after the regional Bell operating companies laboriously prove they have met the 14 conditions for local competition mandated by the Telecommunications Act of 1996. "I don't see prices coming down at all, at least for a couple of years," says George David, head of the Center for Communications Management Information, a rate analysis firm in Rockville, Md.

Prices will remain where they are because of the phenomenal capital investments required to build alternative local loops. And don't look for regulatory developments following the enactment of the telecom act to necessarily pave the way to lower prices. Jim Blaszak, a Washington, D.C. attorney representing large corporate users, notes the tendency for proceedings at the Federal Communications Commission to drag out beyond the original timetable, even after the commission has made a decision.

"You know what happens — it issues an order, but then it has a further notice of proposed rule-making, and there are petitions for reconsideration and so on," Blaszak says.

What observers will look for over the next five years is a dramatic reduction of the premium for wide or broadband capacity. This will come, in part, as carriers install Synchronous Optical Network (SONET) rings and other advanced fiber media, which lead to a dramatic reduction in the bit-for-bit cost of carrying traffic.

But the best impetus for a flatter price structure will result if competition develops from multiple sources — wireline, cable, satellite and wireless providers, Dzubeck says. "Those four media providers are going to be extremely competitive in delivering high-bandwidth services," he explains.

Tariffs and the filed rate doctrine

Network managers today put themselves at a common carrier's mercy whenever they buy a network service. Even if they negotiate a multiyear special deal at deep discounts off the official price in the carrier's tariff, in most cases the carrier can still trump the deal simply by raising the tariffed price in one day's notice. The percentage discount remains the same, but the price still goes up.

Fortunately, all indications are that 10 years from now, users will no longer be in this situation. They'll be able to sit down with carrier reps, negotiate any price at all and set it in stone for a number of months or years.

In fact, if recent developments portend the future, such a milestone may be reached within five years. That's because the legal principle undergirding the current problem is starting to totter. Called the filed rate doctrine, it holds that rates and terms filed with the government supercede those in private contracts.

"The filed rate doctrine was invented to be a shield for users, but instead it has become a sword for carriers," said Hank Levine, a Washington, D.C. attorney for large corporate users.

Recognizing this problem, the FCC last month proposed to end tariffs for the entire long-distance industry. Under the FCC's proposal, carriers would not merely be permitted to stop filing tariffs; they would be prohibited from doing so. The effect would be to kill the filed rate doctrine for interstate network services, Levine said.

But the industry needs to take many more steps before the problem goes away. The FCC's proposal does not apply to any local exchange carrier services. What's more, it does not apply to so-called interstate access services — such as T-1 lines running from a user site to a long-distance carrier's central office — or to intrastate long-distance calls.

Also, many people don't realize that the FCC does not even have authority over AT&T, MCI Communications Corp., Sprint Corp. and other long-distance carriers for circuits running entirely within one state that do not provide access outside the state. For example, the FCC's proposed rule would not apply to an AT&T private line running from Dallas to El Paso, Texas — a distance of some 600 miles.

But in some states — Levine specifies New York and California as prominent examples — the state government is allowing carriers increasing latitude in negotiating with users. And for interstate access lines, the FCC will probably begin selectively removing tariffs in a process parallel to the RBOCs' development of competitive checklists for their local markets over the next couple of years, Levine said.

Of course, the process will be dramatically simplified if a single carrier gains the right — and capability — to provide end-to-end local and long-distance service. But in any case, Levine said, "I think most of these constraints, if not all, will go away by the year 2000."

Microtransactions

A final milestone falls in the emerging electronic commerce arena. A standards body (better that than a government agency) must step in and draw up some standards for microtransactions so goods and services can really be bought and sold over the Internet.

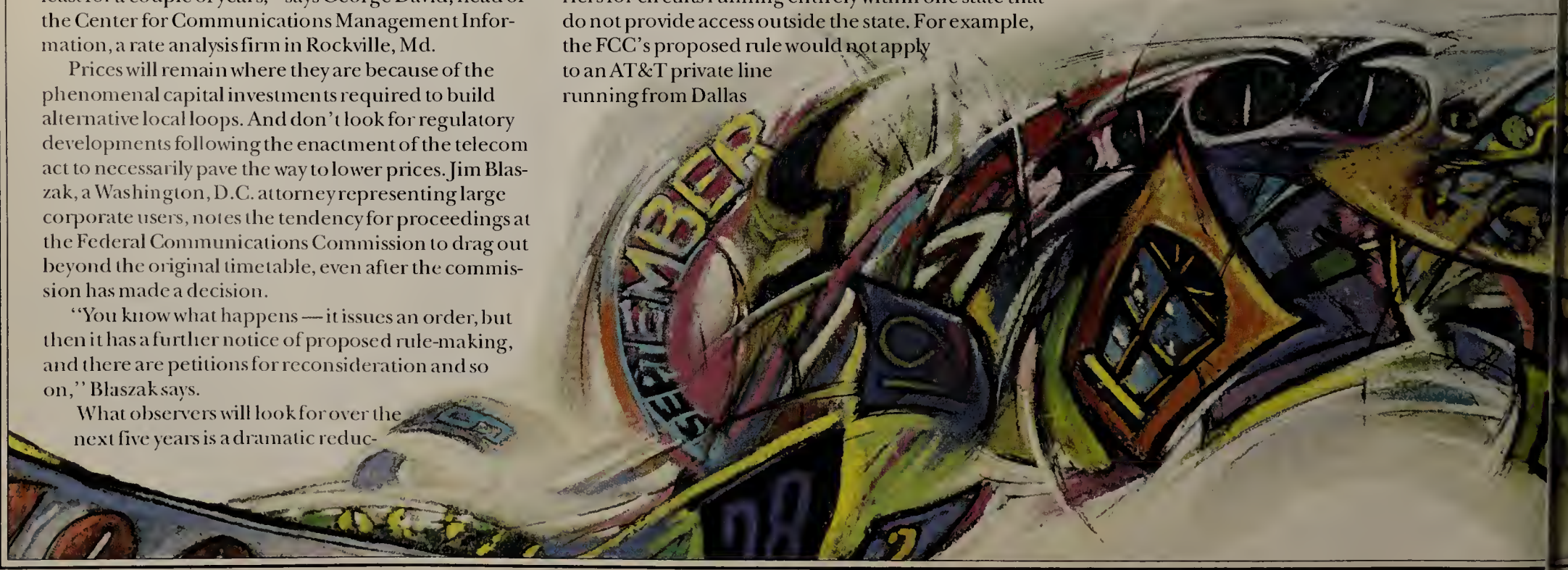
Right now, if a company wants to charge 10 cents for a database retrieval, it can't unless the buyer already has an account with it. It would cost the company more to bill for the service than it would to actually provide it.

"For casual transactions, you don't want to have to set up accounts all over the place," Gibbs says. "There needs to be a cost-effective and efficient way to handle these microtransactions."

What's needed is a combination of encryption and authoritative authentication systems. Buyers, for instance, might be able to provide encrypted Social Security numbers as verification of their identity, Gibbs says. "Providers will then have the ability to know who the buyers are and can charge for small or arbitrary amounts," he says.

Toward that end, MasterCard International, Inc. Visa International, Inc., American Express Co. and other credit card companies must agree on a standard encryption/authentication technology and let a couple of central clearinghouses set up shop. They also must offer the same guarantees against consumer liability for fraudulent use of credit cards on the 'Net as they now have for general use. That will lower consumer resistance to electronic commerce.

If all goes well, 10 years from now, you'll be strollin down virtual malls, dropping virtual goods into on-li shopping carts. You'll pay by logging off, perhaps eve inputting a thumbprint ID, and the merchandise will be delivered to your home or office as specified, withi whatever timetable requested. ■



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KEEPING ON THEIR TOES

Ten network professionals ponder what the future holds for them.

Dave Beering


WALTER CALLAHAN

Senior staff telecommunications analyst, Amoco Corp., Chicago

"The environment that we're managing is going to grow in complexity, by the intense change in regulation. All of the markets are changing, and the players also are going to change; power companies are going to start offering Internet access, for example. People who are managing telecommunications in a global enterprise are going to be really challenged to keep up."

Ivan Brass

Vice president of technology engineering, Simon & Schuster, Inc., a Viacom, Inc. company, New York


ANDY WASHNIK

"I'll be dealing with fewer vendors because we're implementing standards in our organization, leveraging its size in purchasing and trying to minimize vendor finger-pointing. The staff will probably be the same size, but because people will be working smarter, we'll be capable of supporting more desktops with more applications per staff member. We'll have some help from tools that automate processes we now do manually."

Peter Brown

Vice president of telecommunications and IT operations, Cargill, Inc., Minneapolis

"Many of Cargill's locations are in more remote parts of North America and in the developing parts of the world. We need to get to a much higher availability of digital services there. But to do that, you're going to have to have a meeting of the minds on the issues of accounting rates and rate structures."

Paul Edmunds

Senior IS analyst, Duke Power Co., Charlotte, N.C.


DANIELE SWOCK

"Fast rules processors and intelligent agents will gather the kind of information [from the network] that we really want to see, so our role as programmers, 'configurators,' systems administrators will diminish, and we'll be able to focus more on strategic issues. I'll be less of a data manipulator and more of an information processor. The trend will continue toward empowered individuals and teams."

Curtis Olliff

Systems/network coordinator, Alameda Ambulatory Care, Oakland, Calif.

"Network managers will be more centralized within an organization but supporting a broader area and bigger number of users, some of them remote but fewer than today. Productivity falls if there are too many home workers, and we'll see that trend reverse. We'll be running Microsoft Unix on *[2001*'s] HAL, entering commands by voice recognition or by virtual reality 3-D interfaces. I'll be managing business operations on the Internet."

Steve Rosenfeld

Telecommunications manager, University of Texas, El Paso

"I'm constantly answering questions and putting out fires, and I don't see it changing. I see it getting worse — doing more with less. As long as you have engineers in the back room figuring out how to get OC-12 and OC-92 to the desktop, it'll be a challenge for the network manager. You're also going to see tremendous integration of computers with telephones, and I'm hoping — God, I'm hoping — for better management systems."

Rick Sturm

Technical staff member, US WEST Communications, Inc., Boulder, Colo.


WALTER CALLAHAN

"We're going to see a maturing of tool sets, and the processes for managing networks and systems. The two together are going to enable more products to be produced that automate [routine] functions. That leads us into a scenario where we start to have concentrations of specialists — people who have to know more about less."

John Scoggin

Supervisor of network operations, Delmarva Power & Light Co., Wilmington, Del.

"Over the next 10 years, you'll see a lot more emphasis placed on certifications and perhaps something akin to professional engineering-type structures set up in this area. I think network management is going to become fairly specialized in a lot of ways, as opposed to now, when you wind up being chief cook and bottle washer. The criticality of what we're doing is growing quickly."

Wayne Wilson

Senior manager of IS, Blue Cross/Blue Shield of Tennessee, Chattanooga

"[BCBST] must be much more responsive to the marketplace and bring products out faster. This puts a new burden on IS to respond faster than we have ever before. To do this, the object-oriented concept has to come in at the system level. There also will be a trend toward contracting for specialized services. Rather than any business trying to be all things to its customers, if the product involves components that someone else can build, it would let the specialists do their things, and acquire or integrate their service."


BETSY BASSETT

Jerry Zickrick

Network manager, ProBusiness, Pleasanton, Calif.

"More of us will work from the home. We'll have far more tools to remote-manage and remote-update systems. When the user does call for help, I'll fire up an integrated desktop and be able to see his profile from anywhere. I see our world doing a circle back to central processing. I think that's a mistake, but it will change in the next five years. We'll have some centralized client/server computing but some switching back to truly distributed processing. In 10 years, we'll have a good mix of both."

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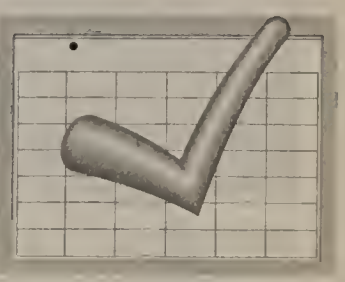

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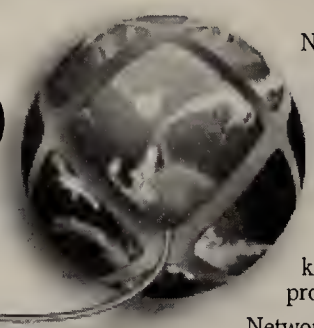

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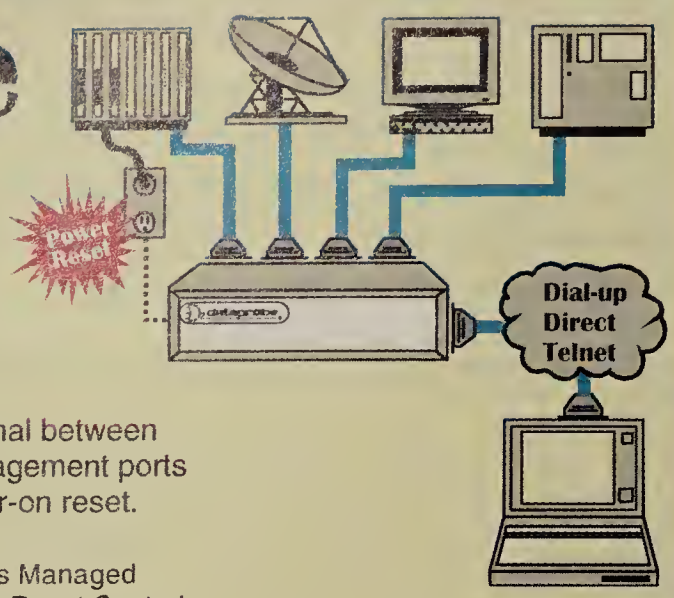

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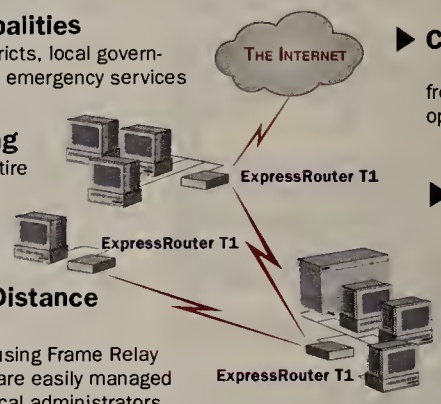

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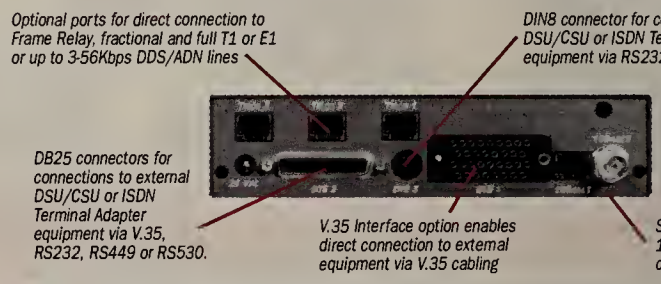

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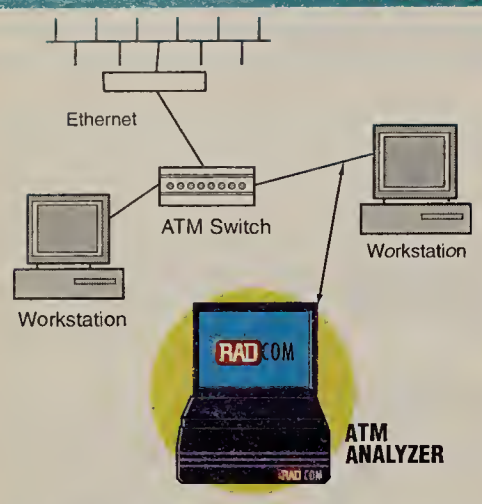

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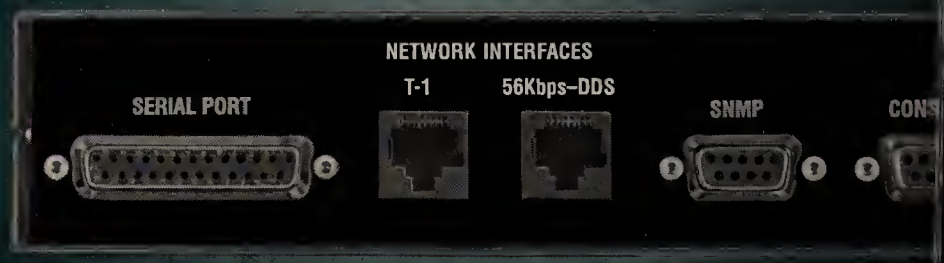

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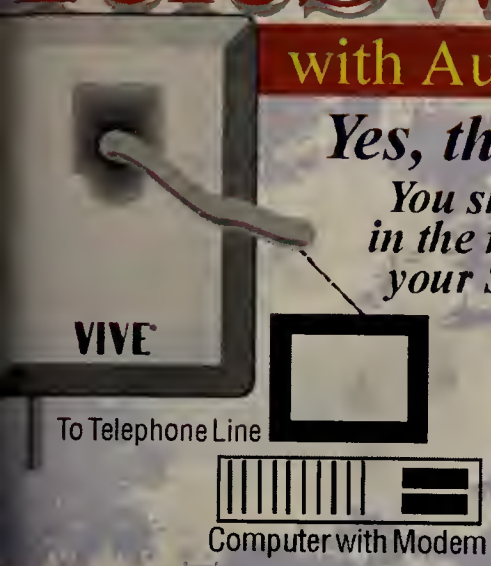

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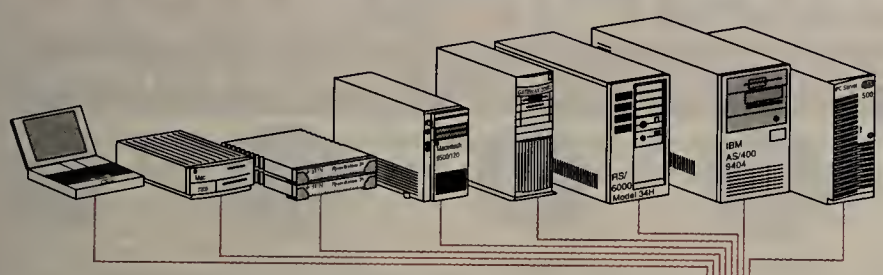

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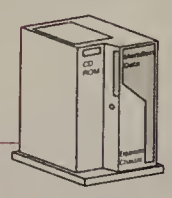

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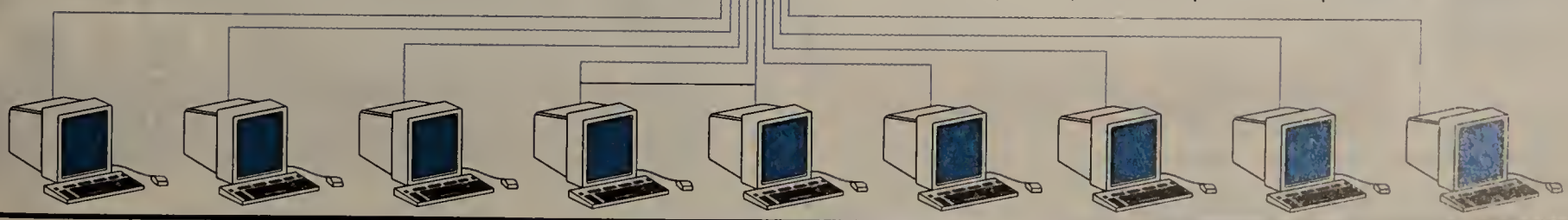

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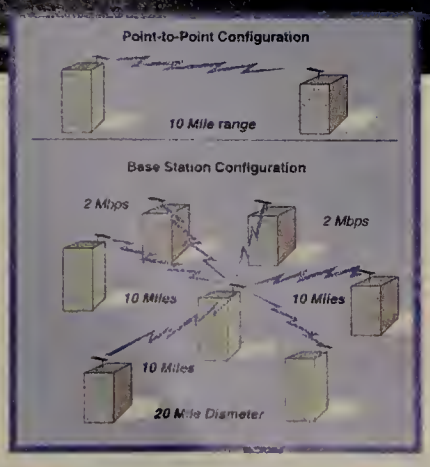

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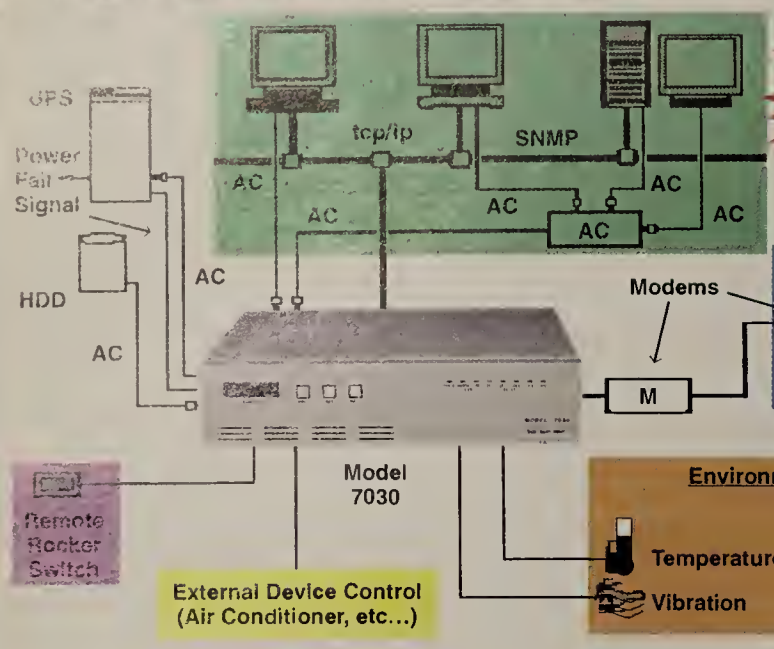

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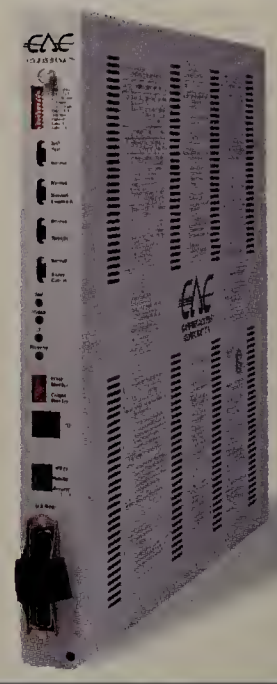

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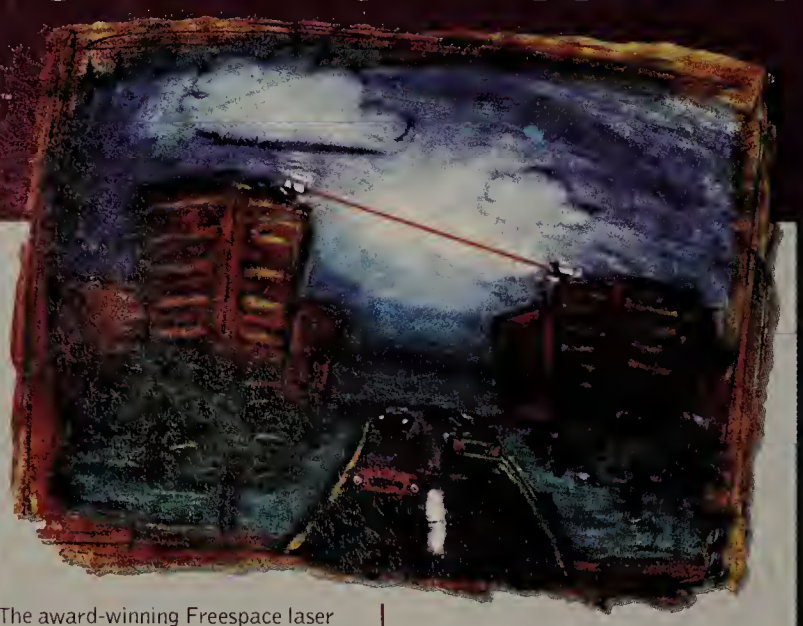

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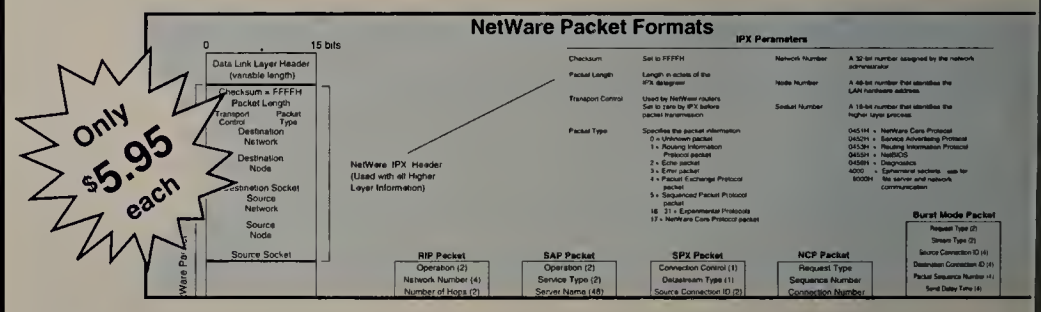

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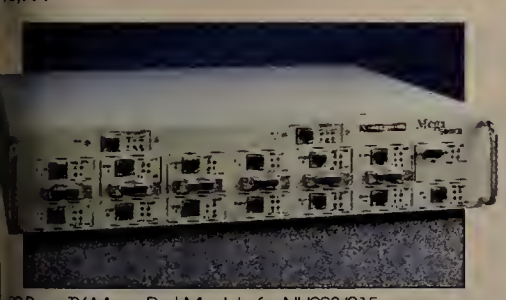

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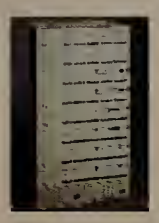

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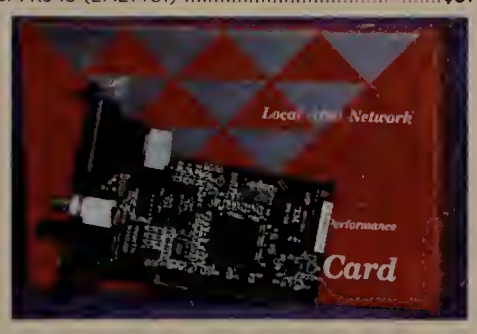

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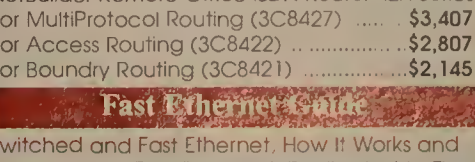

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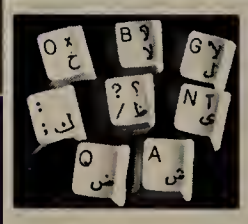

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Internet firewalls Buyer's guide vendors are listed on page 76.

ADVERTISER INDEX

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Predicting the next 10 years: Back to looking forward once again

Here at the Gibbs Institute of Quantum Prognostication and Entropic Business (motto: marketing thermodynamics means you can't win, you can't lose and you can't break even), we've gone back to looking forward to see where we'll be when we get there. Or something like that.

2002: It will leak out that token ring was just a joke cooked up by merry pranksters.

After connecting our linear accelerator to our proton centrifuge and feeding the output into Windows 95, we derived the following probable future history:

1997: Banyan will finally start to market VINES and StreetTalk rather than just rely on the fact that everybody knows how good they are. It will be too late. Banyan will go broke and be sold to a Taiwanese conglomerate that thinks it is buying a U.S. deodorant manufacturer.

It will become increasingly obvious that telcos don't understand the Internet.


Mark Gibbs

1998: Cheap, high-speed consumer access to the Internet ($5 per month for 10M bit/sec) will become widely available in the U.S. The Home Shopping Network will go on-line in a big way. But every time you go to their site, all they will be selling will be Diamonique jewelry.

The telcos still won't really understand the Internet.

1999: Every nun in the U.S. will have her own Web page. Sister Basil of the Church of Eternal Indulgence will get a "Top 5% of Internet Sites" rating, which will become a hotly debated issue, culminating with President Clinton and Newt Gingrich indulging in fisticuffs.

The telcos still won't really understand the Internet.

2000: Bill Gates will become the richest life-form in the universe. Billions of begging letters to him will arrive from some obscure planet in the Crab Nebula, bringing the U.S. Postal Service to its knees. This won't actually be that remarkable, as E-mail will have reduced the postal service to delivering letters once a week.

The telcos still won't really understand the Internet.

2001: After 20 years in the business it created, IBM will decide it's had enough of OS/2, Lotus and anything to do with PCs. It will refocus (go back to selling mainframes), regroup (shed 10 million in staff), and sell Lotus to Novell for $5 and a copy of NetWare 10.1.

The telcos still won't really understand the Internet.

2002: It will leak out that token ring was just a joke cooked up by those merry pranksters down in Baton Rouge. Lou Gerstner will be hung in effigy, and he will never visit that town again.

The telcos still won't really understand the Internet.

2003: The number of books written about the Internet will pass the one million mark, and "official" guides that identify 'Net resources that vanish even before the guide's publication will be as popular as ever.

The telcos still won't really understand the Internet.

2004: I will celebrate a decade of writing for *Network World*. Sonny Bono will become president.

The telcos still won't really understand the Internet.

2005: An investigative journalist for the *National Enquirer* will reveal that the FBI has been recording every packet crossing the Internet for the past 15 years and has stored the data on one trillion 1/2-inch mag tapes in a warehouse in Poughkeepsie. Due to bad planning, the warehouse will have no humidity control and the label on every tape will fall off. The FBI will still consider the tapes vital to public security.

The telcos still won't really understand the Internet.

2006: The telcos will finally understand the Internet. Too late. This is the year networking will be completely transformed by &%$*(#!*... Sorry, our machine just broke down.

Tell Gibbs your version of the future at mgibbs@gibbs.com or (800) 622-1108, Ext. 504.

Network historian takes walk down 10-year memory lane

My assignment for *Network World's* 10th anniversary issue was to write about the past. You know, a history lesson. Piece of cake, I thought. Historians often are just journalists looking backward; it seemed like a natural fit.

Maybe that's why some give history a bad rap. Industrialist Henry Ford bluntly declared, "History is bunk." Prince Otto von Bismarck, who founded the German Empire, agreed: "History is simply a piece of paper covered with print."


Dave Buerger

Such movers and shakers knew that history—be it of manufacturing, politics or (dare I say it?) networking—often yields a biased view.

"The so-called lessons of history are, for the most part, the rationalization of the victors," said American academic Max Lerner. "History is written by the survivors."

Lest our view of history be biased then, consider the victories that can be found in some of the technologies labeled as failures in this issue of *Network World*.

Picking winners and losers is not easy, even with a decade of hindsight.

LAN Manager's most ardent supporter was 3Com Corp. 3Com's chairman thought LAN Manager, among other things, could topple the dominance of Novell, Inc.'s NetWare LAN software. He thought wrong and lost his job. But yesterday's failure by 3Com, Microsoft Corp. and the other LAN Manager partners served as training wheels for today's success. Microsoft now has NetWare on the run with Windows NT Server.

Similarly, the private branch exchange as a LAN alternative was just a surface failure. The PBX's nonblocked switching architecture is the basis for today's hot LAN switching and Asynchronous Transfer Mode technologies.

PBX vendors' real failure was their reluctance to build separate boxes for transmitting only data. That mistake will cost those vendors billions in lost revenue.

Ironically, some LAN vendors now want to also handle voice. For now, PBX are second to none at voice processing, and they are more reliable. Regarding the latter, LAN vendors still have many lessons to learn from the PBX.

ISDN is supposed to be another failure. Maybe so, yet I bet most users will have to make do with ISDN for many years—despite competition from telecommunications reform and growing anticipation of faster alternative technologies. Call ISDN a working failure.

Some technologies deserved to fail. I vividly recall the arrogance of Pacific Bell's Central Office (CO) LAN marketing team during the mid 1980s. They were miffed because I (who was then mere customer) dared question the relevance of that technology. (Ironically, my small business network architecture today borrows much from the CO LAN concept, although an Internet service provider has mostly replaced the phone company.)

But network history lessons should not dwell on failures. There is much we can learn from successful technologies, especially in planning for the future.

The most successful network technology of the past decade was Ethernet. Those of us who muddled through and cursed early coaxial cable-based Ethernets never gave LANs a second thought after the debut of 10Base-T. The network life simply became good, thanks to this technology.

Now, according to a recent poll by *Computer Reseller News*, 43% of the resellers surveyed say they sell Fast Ethernet and 25% plan to add this technology—more so than any other network technology.

Ethernet's success, coupled with the expanding capabilities of Fast Ethernet and the promise of gigabit Ethernet on the horizon, makes you wonder if people running production networks have more to lose by switching to bleeding-edge technology than sticking with the tried and true.

Picking winners and losers is not easy, even with a decade of hindsight. Who knows? When we analyze technologies in our 20th anniversary issue in 2006, some of today's victors could be distant memories.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.

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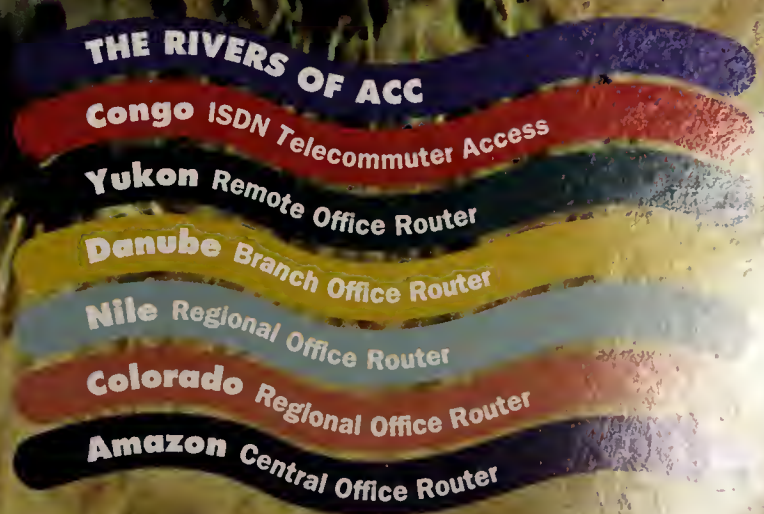

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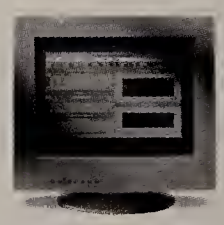

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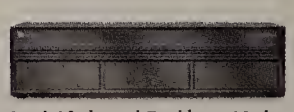

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